1. Introduction

Relationship between economic development and environmental degradation was first placed on the international agenda in 1972 at the UN Conference on the Human Environment, held in Stockholm. After the conference governments set up the United Nations environment Programme (UNEP) which till to date continues to act as a global catalyst for actions to protect the environment. During the succeeding years little was done to integrate environmental concerns into national economic planning and decision making. In 1983 the UN setup the World Commission on Environment and Development led by Gro Harlem Brundtland of Norway. The commission put forward the concept of sustainable development as an alternative approach to one simple based on economic growth, meeting the present needs without compromising the ability of future generations to meet their own needs.

Considering the 1987 Brundtland's report, the UN General Assembly called for the UN Conference on Environment and Development (UNCED) also known as "Earth summit". The conference which was held from 3-14 June 1992, at Rio de Janeiro in Brazil, brought environmental agenda into the sharp focus of the international community. As a result 108 governments at the summit adopted three major agreements aimed at changing the traditional approach to the development:

- Agenda 21 – a comprehensive programme of action for global action in all areas of sustainable development
- Rio Declaration on Environment and Development
- The Statement of Forest Principles

The "Earth Summit" also reached a set of unprecedented, legally binding Conventions essential to protect global environment:

- United Nations Convention on Biological Diversity (UNCBD)
- UN Framework Convention on Climate Change (UNFCCC)

In addition significant progress was also made towards the finalization of the UNCCD. At the summit the UN was also called on to negotiate and opened for signature in Paris in October 1994. The Convention entered into force on December 26, 1996, 90 days after the 50th ratification was received.

Pakistan signed the UN Conventions on Biological Diversity (UNCBD) and UN Framework Convention on Climate Change (UNFCCC) in 1992 in Rio, which were later ratified by the Federal Cabinet in 1994. Pakistan became a signatory to the UNCCD on October 15, 1994 and ratified it on February 24, 1997.

Despite best efforts and the stated commitments, many countries have limited capacity to implement these conventions in true spirit. Over the last decade, capacity constraints have been increasingly recognised, as a main obstacle to sustainable development in many countries including Pakistan. Accordingly, the development community has paid increasing attention to capacity development and capacity assessment in its policies and projects.

In May 1999, GEF council approved a strategic partnership between UNDP and the GEF Secretariat as and 18-month consultative planning process (Capacity Development Initiative –

CDI) to prepare a comprehensive strategy and action plans to strengthen the capacity of recipient countries in order to meet the challenges of global environmental action. The workplan of this consultative process is divided into three stages:

- Assessment of capacity development needs;
- Development of a comprehensive strategy for multi stakeholder action to meet identified needs; and
- Development of action plans for GEF financed activities to contribute to the strategy.

As a first step in implementing the CDI recommendations, the GEF council approved funding for the country wishing to undertake "national self-assessment of capacity building needs". The purpose is to support a country-driven consultative process of analysis and planning that will determine national priorities and needs for capacity development to protect the global environment.

1.1 NCSA Scope and Objectives

The scope of this study is to identify national capacity constraints and priorities to meet binding commitments contained in the three Rio conventions on Biodiversity, Climate Change and Desertification and determine how best to develop this capacity to meet Pakistan's commitment to global environmental management through the production of a strategy and action Plan . The specific objectives to be accomplished through the NCSA included:

- Identify, conform, or review priority capacity issues for action within thematic areas of biodiversity, climate change, and desertification.
- Explore related capacity needs within and across the three thematic areas.
- Reinforce and strengthen existing institutions, mechanisms and processes to create a sustainable institutional framework and process for effective environmental management.
- Examine the institutional and individual capacities to effectively represent Pakistan's position at environment related conventions, negotiations and meetings.
- Raising awareness among key stakeholders of the requirements and implications of the Conventions, to help ensure that Pakistan fulfills its obligations.
- Support the creation of a National Environmental Capacity Development Committee to coordinate and monitor the implementation of Action.
- Link country action to the broader national environmental management and sustainable development frameworks.

1.2 NCSA Outputs and Expected Outcomes

The main out puts of the NCSA will be:

1) NCSA final report
2) National Capacity Action Plan and Identification of follow up projects

1.3 Levels of Capacity Assessment

The capacities are assessed at three levels:

1.3.1 Capacity Assessment at Systemic Level

Capacity assessment at the systemic level emphasises the overall policy framework in which individuals and organisations operate and interact with the external environment, as well as the

formal and informal relationships of institutions. The assessment at systemic level included, policy framework, legal and regulatory framework, management accountability framework, economic framework, systems level resources and processes and relationships.

1.3.2 Capacity Assessment at Institutional Level

Capacity assessment at the institutional level focuses on the overall organisational performance and functioning capabilities, as well as the ability of an organisation to adapt to change. It aimed to develop the institution as a total system, including individuals, groups and the organisation itself. Assessment involved mission/strategic management culture/structure/competencies, processes human resources, financial resources, information resources and infrastructure.

1.3.3 Assessing Capacity Constraints at the Individual Level

Capacity assessment at the individual level referred to the process of changing attitudes and behaviours-imparting knowledge and developing skills while maximising the benefits of participation, knowledge exchange and ownership. The main indicators used for capacity assessment at individual level are, job requirements and skill levels, training/retraining, career progression, accountability/ethics, access to information, personal/professional networking, performance/conduct, incentives, integrity and attitudes, morale and motivation, work redeployment and job sharing inter-relationships and team work interdependencies and communication skills.

1.4 Capacity Building[1]

Capacity is the ability of individuals, groups, organizations and institutions to address and manage environmental problems as part of efforts to achieve sustainable development. There are three levels of capacity building – individual, institutional and systemic. The systemic level is where the individual and the institution operate and interact with the external environment. Aim of capacity building is to build capacity, where non exists, and develop, strengthen, enhance, improve and retain the capabilities of countries to achieve the objectives of the global environment management, specially in the context of the conventions to which they are party.

In general, 'capacity building' can be defined as "the actions needed to enhance the ability of individuals, institutions and systems to make and implement decisions and perform functions in and effective efficient and sustainable manner". At individual level, capacity building refers to the process of changing attitudes and behaviours, most frequently but not limited through imparting knowledge and developing skills through training. However it also involves learning-by-doing, participation, ownership and process associated with increasing performance through changes in management, motivation, morale and levels of accountability and responsibility.

Capacity building at the institutional level focuses on overall organizational performance and functioning capabilities, as well as the ability of an organization to adopt to change. It aims to develop the institution as a total system, including its constituent individuals and groups, as well as its relationship to the outside. In addition to improvements in physical assets, such as infrastructure, institutional capacity building involves clarification of missions, structures

[1] CDI, 2000. Country Capacity Development Needs and Priorities: A Synthesis.

GEF, 2001. A Guide for Self-Assessment of Country Capacity Needs for Global Environmental Management.

responsibilities, accountabilities and reporting lines, changes in procedures and communications and changes in the deployment of human resources.

At the systemic level capacity building is concerned with the creation of "enabling environment", i.e. the overall policy, economic, regulatory, and accountability frameworks within which institutions and individuals operate. Relationship and processes between institutions, both formal and informal, as well as their mandates, are important.

Capacity building can occur at local level, national, or global levels and amongst any individuals or group of stakeholders – individuals, entities or institutions, as well as at an overall systems level. Interactions between the different levels are also important to overall capacity. Capacity is relevant in both the short term (for example, the ability to address an immediate problem) and the long term (the ability to create an environment in which particular changes will take place). Capacity may imply "action" or "inaction" depending on the result desired. Capacity building does not always involve the creation of new capacity, but often the redeployment or release of latent capacities.

1.5 Linkages to Ongoing Activities

The NCSA process was based on and linked with existing programs and information exchange mechanisms relevant to capacity issues. The process has strived to integrate the results and outputs of past and ongoing capacity assessment and building activities, by ensuring the involvement of a wide range of stakeholders in the implementation of the NCSA project.

The NCSA has taken into consideration the relevant activities and outputs of the National Conservation Strategy (NCS), Provincial Conservation Strategies, Biodiversity Action Plan (BAP), the 1st National Communication on Climate Change (NCCC), National Reports on the UNCBD and UNCCD, National Action Programme for Desertification, and Bio-safety Guidelines (now Bio-safety Rules). The team has also made efforts to ensure that the outputs of all action plans related to environmental management in Pakistan are integrated into the NCSA process. The outcomes of NCSA have provided valuable strategic directions for the consolidation of environmental planning and management activities within the short-term medium-term and long-term development plans of the country.

2. Summary of Rio Conventions

United Nation's Convention on Biological Diversity (UNCBD)[2]

The United Nations Convention on Biological Diversity (UNCBD) was one of the two original agreements opened for signature at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in June 1992. It entered into force on 29 December 1993 and currently has 188 Parties. The UNCBD has adopted an inclusive definition of biodiversity and as such represents the first-ever global agreement to cover all aspects from genetic resources to species and ecosystems. The overarching aim of the Convention is to ensure the conservation and sustainable use of all components of biological diversity. It is also the first Convention to recognize that conserving biological diversity is "a common concern of humankind" and fundamental to sustainable development.

[2] Analysis of UNCBD at annex-1

The objectives of the UNCBD are "the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources, including by appropriate access to genetic resources and by appropriate transfer of relevant technologies, taking into account all rights over those resources and to technologies, and by appropriate funding".

Pakistan signed the UN Convention on Biological Diversity (UNCBD) in 1992, which was later ratified by the Federal Cabinet in 1994 and appropriate measures for its implementation were initiated simultaneously. After Ratification of UNCBD, then Ministry of Environment, Local Government and Rural Development of Pakistan in 1994, along with the World Bank, established an ad hoc Biodiversity Conservation Coordination Group (BCCG) for developing a proposal for institutional requirements of the Convention. One requirement was the development of a National Biodiversity Action Plan. During 1996, the World Bank provided funding through the Global Environment Facility (GEF) for the concurrent development of a Biodiversity Action Plan (BAP, Annexure-2) and a proposal for a protected areas initiative, which came to be known as the Protected Areas Management Project (PAMP). The ad-hoc BCCG was dissolved soon after funding was procured.

A Project Management Team (PMT), comprising representatives from then MELG&RD, IUCN-P and WWF-P, was constituted to guide the process of developing the BAP and PAMP proposal. The PMT met once a month during the initial months and then at significant stages of project development. IUCN-P was chosen as the lead implementation agency in collaboration with the World Wide Fund – Pakistan (WWF-P). An advisory body, known as the Biodiversity Working Group (BWG), was formed soon after the launch of the BAP project. The BWG, comprising 22 national level experts from different related fields, was tasked with reviewing and approving the BAP and recommending actions based on obligations under the Convention on Biodiversity (UNCBD) for incorporation into the BAP. The Group was also tasked with offering technical advice on various biodiversity initiatives, including the PAMP. These experts included environmentalists, foresters, specialists in wildlife, livestock, agriculture, natural history, taxonomy, fisheries, tourism, marine sciences, zoology, biotechnology, protected areas management, development practitioners from across sectors including economists. Economic input was relatively thin, a surprising omission, considering how critical biodiversity-economics linkages are.

In general following steps have been taken for the implementation of UNCBD in Pakistan;

- Devising strategies and plans that seek, increasingly to place natural resource management concerns in the development and poverty alleviation.
- Formulating laws regulations and standards that aim to define rights and responsibilities for managing the natural resources.
- Introducing policies and procedures for complying with the country's legal framework and international obligations.
- Establishing and strengthening public sector institutions for management of natural resources.
- Engaging the private sector in dialogue and motivating it to respond to domestic and international concerns with the environments and sustainable use of natural resources.
- Rallying on NGOs and CBOs to natural resource conservation objectives.
- Initiating the mass media for awareness of environmental issues.

- Investment in formal training in natural resource conservation and management disciplines and sensitizing managers and policy makers to environmental issues.
- Implementing projects for identification, protection and conservation of natural resources and wild life habitats.
- Pursuing international cooperation with more vocal advocacy of Pakistan's needs for sustainable development and its common causes.

Recognizing that the key to maintaining biodiversity depends upon using this diversity in a sustainable manner, the Convention translates its guiding objectives of conservation, sustainable use and equitable sharing of benefits into binding commitments and obligations on Parties. These are articulated in detail under the provisions contained in Articles 6 to 20 of the Convention. In addition, the Conference of Parties (COP) has identified and initiated work on following thematic work programmes, specifically;

i) Inland waters biodiversity
ii) Marine & coastal biodiversity
iii) Island biodiversity
iv) Agricultural biodiversity
v) Forest biodiversity
vi) Dry lands biodiversity
vii) Mountain biodiversity

Recognizing these seven thematic work programmes the provisions of the UNCBD specifically encourage countries like Pakistan to act in the following areas:

- Conservation of ecosystems and natural habitats and the protection and restoration of populations of species in and outside their natural habitats;
- Sustainable use of biological resources;
- Identification and monitoring of biodiversity;
- Exchange of information relevant to the conservation and sustainable use of biological diversity;
- Technical and scientific cooperation for meeting the objectives of the Convention;
- Incentives for economically and socially sound conservation and sustainable use of biological diversity;
- Research and training on the identification, conservation and sustainable use of biodiversity;
- Public education to raise awareness about the importance of biodiversity;
- Impact assessments of proposed projects that are likely to have significant adverse effects on biodiversity;
- Access to genetic resources and fair and equitable sharing of the benefits of their utilization;
- Transfer of technology among parties to the Convention to promote the conservation and sustainable use of biodiversity;
- Handling of biotechnology to ensure the safe transfer, handling and use of genetically modified organisms;
- National reporting to the Conference of the Parties on the effectiveness of measures taken to implement the Convention; and
- The provision of financial resources.

2.1.1 Cartegena Protocol

In addition to these, the COP adopted the Cartegena Protocol on Biosafety in January 2000. The Protocol was negotiated pursuant to Article 19 (3), which required the COP to consider the need for and modalities of a protocol. It was adopted in accordance with Article 28 of the Convention and opened for signature in Nairobi on 15 May 2000. It currently has been signed by 108 Parties to the Convention and ratified by 69 Parties. The Protocol came into force 90 days after the deposit of the fiftieth instrument of ratification, with the COP to the Convention serving as the meeting of the Parties to the Protocol, which is in turn the governing body of the Protocol. Pakistan has signed and ratified the Cartegena Protocol on Bio-safety.

2.2 United Nation's Framework Convention on Climate Change (UNFCCC)[3]

After Stockholm Conference on Environment in 1972 little work was done on issues like global warming, depletion of ozone layer and water pollution, which became more serious and destruction of natural resources accelerated at an alarming rate.

Recognition of the human interference upon the earth's climate was first acknowledged at the First World Climate Conference held in Geneva, from 12-23 February 1979. Conference was sponsored by the World Meteorological Organization in collaboration with other international bodies. Specialists from many discipline assembled for the conference expressed their views concerning climate variability and change and the implication for the world community. It was decided to take full advantage of present human knowledge of climate, and to take steps to improve that knowledge and foresee to prevent potential man-made changes in climate that might be adverse to the well being of humanity.

During the 1980s governments grew progressively more aware of climate issues and in 1988 the United Nations General Assembly adopted resolution 43/53, proposed by the Government of Malta, urging the 'Protection of global climate for present and future generations of mankind.' In the same year the governing bodies of the World Meteorological Organization and the United Nations Environment Programme created a new body, the Intergovernmental Panel on Climate Change (IPCC). It is mandated with assessing the most up to date scientific, technical and socio-economic research on climate change. Since its creation, once every six years, it has produced a full assessment of the current state of scientific knowledge on climate change and what it means for us. These reports synthesize evidence and analyses published either in peer-reviewed journals or other credible sources. First Assessment Report of the IPCC, 1990 presented the first confirmed evidence for the threat of climate change.

The Second World Climate Conference (SWCC) held in Geneva from 29 October-7 November 1990. During the conference a declaration was adopted by six Heads of States or Government, 70 Ministers and other representatives of 137 countries and recognized climate change as a common concern for mankind. It committed countries, UN and its different agencies to a range of actions, especially those leading to a global framework convention on climate change. The General Assembly responded by passing resolution 45/212, formally

[3] Analysis of UNFCCC at annex-2

launching negotiations on a convention on climate change. These negotiations were conducted by an Intergovernmental Negotiating Committee (INC).

The INC first met in February 1991 and its government representatives adopted the United Nations Framework Convention on Climate Change, after just 15 months of negotiations, on 9 May 1992. At the Rio de Janeiro United Nations Conference on Environment and Development (Earth Summit) of June 1992, the new Convention was opened for signature. Twenty years after the first global environment conference, the UN sought to help Governments rethink economic development and find ways to halt the destruction of irreplaceable natural resources and pollution of the planet by adopting UN Framework Convention on Climate Change.

The overall objective of the United Nations Framework Convention on Climate Change (UNFCC) is to manage climate change through "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Convention establishes a framework for intergovernmental efforts to tackle climate change, acknowledging the rate of change in natural systems. As such the Convention allows for "a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

The Convention establishes a set of principles and articulates specific commitments for different groups of countries. The primary principal of differentiation is according to their circumstances and needs that the action may be taken according to the level of national contribution to the greenhouse gas emissions. The second guiding principle recognizes national sovereignty over natural resources within national jurisdictions. This principle acknowledges individual sovereignty and empowers countries with the autonomy and authority to determine or define their development priorities.

The Convention also provides a set of institutions to enable governments to monitor implementation and to share insights on how best to pursue the Convention's aims. The countries should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed country Parties should take the lead in combating climate change and the adverse effects thereof. The specific needs and special circumstances of developing countries especially those that are particularly vulnerable to the adverse effects of climate change should be given full consideration.

Countries should take cost effective precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects according to different socio-economic contexts. These policies and measures should be comprehensive, covering all relevant sources, sinks and reservoirs of greenhouse gases and comprising all economic sectors and the policies should be integrated with national development programmes.

The Convention recognizes three main groups of countries, (ANNEX I Parties, ANNEX II Parties and NON-ANNEX I Parties) which are afforded different obligations and commitments under the provisions of the Convention. These are based on countries respective commitments under the Convention, their abilities and contributions to green house gases. The Convention

acknowledges the 48 countries defined by the United Nations as Least Developed Countries (LDCs). These are given special consideration under the Convention on account of their limited capacity to respond to climate change and adapt to its adverse effects. In addition, Parties to the Convention are urged to take full account of the special situation of LDCs when considering funding and technology-transfer activities.

The UNFCC was opened for signature at the Nations Conference on Environment and Development (Earth Summit) in 1992 in Rio de Janeiro and came into force on 21 March 1994. The Convention currently has 186 signatories. Pakistan signed the United Nations Framework Convention on Climate Change (UNFCCC) in Rio in 1992. It was ratified in June 1994 and it became effective for Pakistan, as Party, with effect from 30th August 1994.

Considering specific national and regional development priorities, objectives and circumstances, article 4 describes following commitments to be fulfilled by Pakistan as signatory to the Convention:

(a) Develop, periodically update, publish and make available to the Conference of the Parties, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties;

(b) Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases and measures to facilitate adequate adaptation to climate change;

(c) Promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases in all relevant sectors, including the energy, transport, industry, agriculture, forestry and waste management sectors;

(d) Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems;

(e) Cooperate in preparing for adaptation to the impacts of climate change; develop and elaborate appropriate and integrated plans for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas, particularly in Africa, affected by drought and desertification, as well as floods;

(f) Take climate change considerations into account, to the extent feasible, in their relevant social, economic and environmental policies and actions, and employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change;

(g) Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation and development of data archives related to the climate system and intended to further the understanding and to reduce or eliminate the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies;

(h) Promote and cooperate in the full, open and prompt exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies;
(i) Promote and cooperate in education, training and public awareness related to climate change and encourage the widest participation in this process, including that of non-governmental organizations; and
(j) Communicate to the Conference of the Parties information related to implementation, in accordance with Article 12.

2.2.1 Kyoto Protocol

The First Conference of Parties (CoP-1) to UNFCCC, held in Berlin in 1995, inter-alia, reviewed the process to strengthen the commitments to the Convention. The CoP-1 had requested the developed countries/other Parties both to elaborate policies and measures, and to set quantified limitations and reduction objectives within the specific time frame, such as 2005, 2010, 2020 for their GHG emissions and their removals by sinks. The objective was achieved when the Third Conference of Parties (CoP-3) to UNFCCC, held in December, 1997 in Kyoto, unanimously adopted Kyoto Protocol to UNFCCC. Building on the framework of the UNFCCC, the Kyoto Protocol broke new ground with its legally binding constraints on GHG emissions and its innovative "Mechanisms" aimed at cutting the cost of curbing emissions. Presently, 186 countries (including the European Community) are Parties to the Convention.

Kyoto Protocol is a continuation of the process started by UNFCCC. It also binds the developed countries to quantified emission limitation / reduction commitments in respect of six (6) GHGs, i.e. Carbon dioxide (CO_2), Methane (CH_4), Nitrous oxide (N_2O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs), and Sulfur hexafluoride (SF_6), during the period from 2008 to 2012. The Kyoto Protocol proposes to set up framework for

(a) Joint Implementation of projects aimed at reduction of ToR;
(b) Establishment of Clean Development Mechanism (CDM) (under Article 12); and
(c) Emission Trading (under Article 17), which could be availed by all developing country Parties, including Pakistan.

In November 2001, during the 7th Conference of Parties (CoP-7), held in Marrakech, Kyoto Protocol was finally agreed and adopted. At CoP-7 most of the world leaders including the G-77/China block firmly committed themselves to an early "entry into force" of the Kyoto Protocol. The Kyoto Protocol became legally binding on its 128 Parties on 16th February 2005.

Recognizing the importance of Kyoto Protocol, this Ministry of Environment Government of Pakistan on 22nd January 2001, submitted a summary for consideration by the Cabinet, regarding Pakistan's accession to Kyoto Protocol. The Federal Cabinet in its meeting held on 31st January 2001 approved the summary, authorizing Pakistan's accession to Kyoto Protocol. The Ministry of Foreign Affairs was intimated accordingly with the request to sign the "instrument of accession" to the Kyoto Protocol. In October 2002, the Foreign Office advised Ministry of Environment to initiate consultations/ cost benefit analysis of Pakistan's accession to the Kyoto Protocol. After completing the process of consultations/ cost-benefit analysis, of accession to the Kyoto Protocol, with the major stake-holders from the public as well as private

sector, regarding Pakistan's preparedness for taking advantage of accession to the Protocol Pakistan ratified the protocol in January 2005.

United Nation's Convention to Combat Desertification[4]

Desertification is the degradation of drylands due to climatic variations and unsustainable human activities which involves the loss of biological and/or economic productivity and complexity in croplands, rangelands, and woodlands. Contrary to general belief, it is not the expansion of existing deserts. Desertification started to draw serious attention after the great Sahelian drought and famine which lasted from 1968 to 1974 and in which over 200,000 people and millions of livestock perished.After this great loss of human and livestock in Africa an Inter-State Permanent Committee on Drought Control in the Sahel (CILSS) was established by 9 Sahelian countries in September 1973.

On 1 May 1974 the General Assembly passed a resolution 3202 (S-VI) recommending that the international community urgently take concrete measures to stem the spread of deserts and to assist the developing countries affected by the phenomenon to ensure the economic development of the areas affected. In another resolution 3337 (XXIX) of 17 December 1974 the General Assembly decided to convene the Conference to give impetus to the international action to combat desertification. The resolution called upon an urgent need to institute a world-wide programme, at the national, regional and global levels to seek solutions to the problems associated with desertification. The resolution also stressed that the Conference, should provide the international community with the basis for launching an action-oriented, comprehensive and co-ordinated plan of action with a view to resolving the problems of desertification.

An adhoc task force was created for following objectives:

(a) To prepare a world map of areas affected and areas likely to be affected by the process of desertification;
(b) To assess all available data and information on desertification and its consequences on the development process of the countries affected; and
(c) To prepare an effective, comprehensive and co-ordinated action programme against desertification, including the building-up of the indigenous and autonomous science and technology capacity.

United Nations Conference on Desertification (UNCOD), held in Nairobi in 1977 during this conference a world map of desertification was presented and in pursuance of paragraph 4 (c) of General Assembly resolution 3337 (XXIX), a Plan of Action to Combat Desertification (PACD) was adopted placing this issue on the international agenda as a worldwide economic, social, and environmental problem.

During the United Nations Conference on Environment and Development (UNCED), held in Rio de Janeiro in 1992, considering the shortfall in efforts to implement the UNCOD on the part of the governments of affected countries as well as international aid donors, developing nations insisted that appropriate attention should be given to desertification. World leaders eventually agreed in Agenda 21 to call on the UN General Assembly to set up an Inter-

[4] Analysis of UNCCD at annex-3

governmental Negotiating Committee to prepare a legally binding instrument by June 1994. After 13 months of negotiations in five sessions, the 'United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa' (UNCCD) was adopted on June 17, 1994 and opened for signature in Paris in October of the same year. The Convention entered into force on December 26, 1996, 90 days after the 50th ratification was received.

UNCCD is the first international treaty to recognize the linkages between poverty and environmental degradation and to emphasize the need for an integrated approach to natural resource management and rural development. It is therefore interpreted as a Multilateral Environmental Agreement (MEA) with specific contributions to make to overarching development frameworks such as poverty reduction strategies. 192 countries are currently Parties to the Convention.

The Convention defines "desertification" as the degradation of soils or more broadly, as the degradation of natural resources, namely: land, vegetation and water. During the eight meeting of Conference of Parties in Madrid in 2007, a 10-year strategy to enhance UNCCD implementation at all levels (Decision 3/COP 8). This strategy will seize opportunities to create a revitalized common ground for all UNCCD stakeholders. The stated vision of the UNCCD ten year strategy is that "The aim for the future is to forge a global partnership to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability".

Pakistan became a signatory to the UNCCD on October 15, 1994 and ratified it on February 24, 1997. Simultaneously the process of its implementation started by preparation of National Action Program to fulfill the requirement of Convention (Articles 9 and 10) and regional and sub-regional action programs (Article 11). Ministry of Environment with the financial assistance of the United Nations Environment Programme (UNEP) and the Economic and Social Commission for Asia and the Pacific (ESCAP), initiated the preparation of National Action Programme (NAP) .Pakistan Agricultural Research Council (PARC) was engaged to develop it and the final draft of NAP was prepared in 2002 and approved by Ministry of Environment.

The NAP was prepared through a participatory and consultative process, involving representatives of national, provincial, and regional departments, international organizations, NGOs, and scientists. NAP identifies the factors contributing to the process of desertification in Pakistan and suggested measures and strategy, using an integrated and coordinated bottom-up approach to combat desertification and mitigate the effects of drought. The main programme areas proposed to address desertification, inter alia, included: afforestation/agro-forestry in degraded areas; improved crop production in dry lands; improved range/livestock feeding and management; soil and water conservation, water harvesting, increased water use efficiency; rehabilitation and reclamation of saline/sodic soils; improvement of drainage and on-farm management, production and promotion of horticultural crops; and conserving biodiversity. NAP also addresses the affects and mitigation of droughts in Pakistan.

NAP envisages establishing the national desertification units in the Ministry of Environment and provincial P&D departments for coordinating the implementation of the programme. A

National Coordination Committee on Desertification headed by the Minister for Environment was formed to oversee the implementation of NAP, assisted by three sub-committees.

The funding sources for the implementation of NAP activities were suggested as Public Sector Development Programme, Global Mechanism of UNCCD, National Desertification Control Fund, a small fee/cess on the export of some products, a small conservation fee from hunters, green funds by trading environmental support services and international donor agencies such as UNEP, UNDP, GEF, FAO, and WFP.

National Coordination Committee on Desertification (NCCD) is a 19-member, inter-ministerial and inter-departmental body in the Ministry of Environment. The NCCD was constituted in 1998 and revised in 1999 and comprises of representatives from the provincial Agriculture Departments, heads of federal units dealing with the research, management and development of natural resources including land, water, forests and wildlife. Rural support programmes, rural development agencies, NGOs, and academia are also given due representation in NCCD.

The participants of the consultative workshop on 3rd assessment report on UNCCD, have suggested to revise the Composition of NCCD giving due representation to non-government sector and holding of ordinary meetings at least twice in year.

3. Terms of References of NCSA[5]

Preparation of the National Capacity Self Assessment (NCSA) Report and Action Plan, on national capacity needs, constraints, and priorities for the implementation of the Climate Change, Desertification and Biodiversity Conventions.

4. Country Profile

Pakistan is located in the west of the South Asian subcontinent with an estimated population around 16.5 million (165,253,500 as on Jan 1, 2009, Population Census Organization of Pakistan). It consists of a rectangular mass extending northeast to southwest, stretching from 24°N to 37°N latitude and from 61°E to 76°E longitude. It covers an area of 803940 sq. km., (about 88 million hectare) with its eastern regions located on the Indian Tectonic Plate and the Western and northern regions on the Iranian plateau and Eurasian land plate. Apart from the 1,046 kilometres Arabian Sea coastline, Pakistan's land boarders total 6774 km, out of which 2430 km with Afghanistan to the northwest, 523 km with China to the northeast, 2912 km. with India to the east and 909 km with Iran to the southwest.

About three-fifths of the country consists of rough mountainous terrain and plateaus, and the remaining two-fifths constitute a wide expanse of level plain. The land can be divided into five major regions: the Himalayan and Karakoram ranges and their subranges; the Hindu Kush and western mountains; the Balochistan plateau; the submontane plateau (Potwar Plateau, Salt Range, trans-Indus plain, and Sialkot area); and the Indus River plain. Within each major division there are further subdivisions, including a number of desert areas.

[5] Detailed ToRs of NCSA are at Annex-4

The land of Pakistan provides a fascinating exhibition of geological evolution. It is a bonanza of different lithospheric plates, which have been accreted together in such a way that has a rare parallel in the world with respect to its structure, relief, rock types and landscape.

The geo-history of Pakistan, as a part of the Indo-Pak Plate, is rooted in the dismemberment of a super-continent the "Gondwanaland" in about Late Jurassic period. Since 55 million years ago, India has steadily rotated counterclockwise. Coupled with Arabia's separation from Africa about 20 million years ago, this rotation caused convergence in Balochistan, collision of various crust blocks in Iran-Afghanistan region and formation of Balochistan fold and fault belt. The India-Eurasia collision produced the spectacular Himalayas along uplifted and deformed 2,500 km long Indo-Pakistan plate margin. The collision between these segments resulted in the formation of new relief and topography, which consists of series of mountain ranges located in the north, northwest and southwest of Pakistan, commonly known as the Himalayan Mountain System. Rapid uplift of the Himalayas to great heights and under the influence of very cold climate of high altitude embraced a blanket of snow and ice during the Quaternary period. Huge amount of detritus carried by the streams emerging from the glaciated Himalayas during the warm interglacial periods, deposited in the Indo-Gangetic Synclinorium gradually, built the Indus Basin with new drainage pattern and new landforms.

Pakistan lies in the temperate zone. The climate is generally arid, characterized by hot summers and cool or cold winters, and wide variations between extremes of temperature at given locations except for the southern slopes of the Himalayas and sub-mountainous tract where the annual rainfall varies between 760-1270 mm. This area has humid sub-Tropical climate. In the extreme north, because of great heights, highland climate prevails.

Aridity is the most pervasive aspect of Pakistan's climate, and its continental nature can be seen in the extremes of temperature. Pakistan is situated on the edge of a monsoonal (i.e., wet-dry) system. Precipitation throughout the country generally is erratic, and its volume is highly variable. The rainy monsoon winds, the exact margins of which vary from year to year, blow in intermittent bursts, and most moisture comes in the summer. Tropical storms from the Arabian Sea provide precipitation to the coastal areas but are also variable in character.

The efficiency of the monsoonal precipitation is poor, because of its concentration from early July to mid-September, when high temperatures maximize loss through evaporation. In the north the mean annual precipitation at Peshawar is 13 inches (330 mm), and at Rawalpindi it reaches 37 inches (950 mm). In the plains, however, mean annual precipitation generally decreases from northeast to southwest, falling from about 20 inches (500 mm) at Lahore to less than 5 inches (130 mm) in the Indus River corridor and 3.5 inches (90 mm) at Sukkur. Under maritime influence, precipitation increases slightly to about 6 inches (155 mm) at Hyderabad and 8 inches (200 mm) at Karachi. The dry, hot weather is broken occasionally by dust storms and thunderstorms that temporarily lower the temperature. Evenings are cool; the diurnal variation in temperature may be as much as 20 to 30 °F (11 to 17 °C). Winters are cold, with minimum mean temperatures of about 40 °F (4 °C) in January.

Pakistan spans a remarkable number of the world's broad ecological regions. According to various classification systems Pakistan includes examples of three of the world's eight bio geographic 'realms' (the Indo-Malayan Realm, Palaearctic Realm and Africo tropical Realm), four of the world's ten 'biomes' (the desert biome, temperate grassland biome, tropical seasonal

forest biome and mountain biome) and three of the world's four 'domains' (the polar/montane domain, humid temperate domain, and dry domain).
Pakistan's sea falls biogeographically within the "Arabian Seas Region 11". The coastal area from Pakistan west to Somalia is considered by Hayden et al. (1984) to be the coastal-margin realm, "Eastern Monsoon (J)'" Regarding its fauna, the Pakistani coast is considered the western-most extent of the vast Indo-Polynesian province.

Pakistan contributes 1.97 % to the global floral biodiversity and 1.7 % to global faunal diversity (World Resources Institute 2000-2001). Mountains and foothills on the north and west cover about half of its area. The remaining half comprises the Indus Plain towards the east, intersected by the Indus River and its tributaries. Of the country's total area of about 88 million ha, 24% is cultivated, of which about 80% is irrigated. Forests and grazing lands cover about 4% and 34% is not fit for agricultural use - about 2% is under urban cover. Agriculture is the single largest sector of the economy. Contributing 21 percent to the GDP and employing 44 percent of the workforce (Economic Survey 2007-08). More than two-third of the Pakistan's population lives in rural areas and their livelihood continues to revolve around agriculture and allied activities. The livestock and diary sectors accounts for 52 percent of agriculture, 11 percent of GDP and affects the lives of 30-35 million people in rural areas. The major crops account for 34 percent of agriculture and 7.1 percent of GDP. Agriculture has suffered a lot during last few years due seasonal fluctuations, pest attacks, shortage of irrigation water and poor management.

The glaciers of Pakistan in the Hindu Kush-Karakoram-Himalayan (HKH) region are nature's valuable source of fresh water for present and future needs of millions of people living in this region as well as down stream. These frozen reservoirs release large amounts of ice melt water to many of the major rivers of the region including Indus River in Pakistan. Crests of the high ranges in the Karakoram–Himalayan region are largely snow bound. The Karakoram has greater ice and snow cover (27 to 37%) than any other mountain system outside the polar region.

The main source of surface water in Pakistan is the Indus River and its tributaries, all of which are perennial and have their origins in the mountains in northern areas. The sources of supply of water to these rivers are glacialmelt, snowmelt, seepage from geological formations and the run-off generated by seasonal rains in the watershed areas. Five main rivers, Jhelum, Chenab, Ravi, Beas and Sutlej, join the Indus River from the eastern side along with 3 minor rivers. On the western side a number of small rivers join Indus River, the biggest of which is river Kabul with its main tributaries i.e. Swat, Panjkora, and Kunar. Several other small streams such as Kurram, Gomal, Kohat, Tai, Tank, etc also join Indus River on the right side. The total catchments area of Indus River System is 374,700 sq. miles (487,110 sq. kms.) lies in Pakistan. The Indus River and its tributaries on average bring about 154 MAF of water annually.

The Indus Basin forms by alluvial deposits carried by Indus River and its tributaries and is underlain by an unconfined aquifer covering about 15 million acres in surface area. In the Punjab about 79 per cent of the area and in Sindh about 28 per cent area is underlain by fresh ground water which is mostly used as supplemental irrigation water and pumped through tubewells. Irrigation agriculture is the main user of both surface and ground water resources of Pakistan. Water stored in Pakistan is much less than the world's average, 40%. The storage capacity of Pakistan is only 9%. At present, Pakistan only stores for 30 days of its river water

only. According to the World Bank, Pakistan is currently close to using up all its surface and ground water and is near to reach at water stress level.

Pakistan being predominantly an arid to semi-arid country with 68 m. ha of land lying in regions where the annual rainfall is less than 300 mm is heavily under threat of land degradation. One fourth of the country's land area, which is suitable for intensive agriculture is seriously subjected to wind and water erosion, salinity/sodicity, water-logging, flooding and loss of organic matter. Water mining without ground water recharge in Balochistan, over-exploitation and misuse of rangelands, mangroves, fragile ecosystems like sandy deserts, Rod Kohi and coastal areas are rendering many areas unproductive and threatening the agricultural economy of the country. The two important driving forces of land degradation in Pakistan are limited land resources and population increase, a consequence of which is poverty.

Main issues related to desertification in Pakistan include: water erosion, wind erosion, depletion of soil fertility, deforestation, livestock grazing pressure, loss of biodiversity, water-logging and salinity, drought and flooding and socio-economic constraints. About 11 million hectares are affected by water erosion and 3-5 million hectares by wind erosion. The amount of soil removed by wind is about 28% of total soil loss. Due to deforestation, forest cover is shrinking by 3.1% and woody biomass by 5% annually (7000-9000 ha taken away annually). Free grazing of livestock, aridity and prolonged drought in arid lands have affected the biodiversity in various regions. About 15.5 million ha are affected by water-logging and 5.0 million ha by salinity/sodicity.

Some technological interventions to address the issues of desertification have been successfully implemented in different parts of Pakistan. Some of these include; Rangelands Utilization Model in Pothwar Plateau, Gully Land Management through Soil Conservation and Water Harvesting, Range Improvement through Community Participation, Salinity Control and Reclamation of Affected Areas, Rehabilitation of Desert Ranges through Reseeding, Forage Reserve Establishment in Arid Highland Balochistan, Reclamation of salt-effected areas, Desertification Control in Cholistan and Restoration of Land Productivity in Barani Lands.

Pakistan is increasingly conscious that pursuit of growth and development has placed a heavy burden on sustainability for now and the foreseeable future. There are efforts being made to integrate environmental agenda into short term, medium term as well as long term national mainstream development plans to establish a just and sustainable economic system and achieving Millennium Development Goals. Over the last decade, significant progress has been made in developing the environmental policy and regulatory framework, development of environmental institutions and raising awareness. The degradation of environment, however, continues at a rate, affecting livelihoods and health as well as increasing vulnerability of the poor to disasters and environment-related conflicts. The current cost of environmental degradation is considerably higher. An assessment by the World Bank in 1995 estimated the total cost of remediation at 2.6 per cent of the GDP.

Pollution of air and water, climate change, ozone depletion, deforestation, desertification and vanishing biodiversity land degradation, lack of waste management, lack of urban land use planning and zoning, has resulted in ecological imbalance, threatening life and civilization. These imbalances, created by man over time, have to be immediately addressed. Hence environment has to be integrated into all development efforts and policy formulations.

The environment does not exist in isolation and there are several other sectors whose development impacts the environment. These sectors come under the purview of different ministries. For countries like Pakistan, such integration is difficult as the socio-economic costs of replenishment of ecology are not fully appreciated. But these upfront initiatives are imperative and not even a shade of the socio-economic losses over years and generations, if left unattended.

Integration of social and environmental considerations into development processes of crosscutting sectors of economy, in a holistic manner, is essential to achieve positive environmental outcomes. Strategic Environmental Assessment in development planning process is, therefore, a pre-requisite for integration of environment at policy, planning and programme level of different sectors.

The sectors where environment has a crosscutting effect and impact linkages but these are not properly integrated/coordinated with the environment sector, including the integrated pest management, application of pesticides/herbicides, persistent organic pollutants (POPs), green accounting/environmental economics, involvement of the private sector, medicinal plants, public-private partnership, energy efficiency, industrial efficiency, transport, urban environment, cultural heritage, sustainable tourism/eco-tourism, population, poverty and environment, communication for sustainable development, environmental education, gender integration, environmental health, education, governance, mining, etc.

In general, the present degraded environmental situation has arisen due to high population growth rate, low level of public awareness and education, irrational management of natural resources, unplanned urban and industrial expansions. More specifically, the following issues have to be addressed by the relevant stakeholders:

(i) Forest cover (4.8% in 1992) could hardly be increased despite all efforts.
(ii) Forestry Sector Master Plan has estimated an annual loss of 2.3 billion rupees as a result of flooding, erosion of fertile soil from upland watersheds and siltation of reservoirs and irrigation system.
(iii) Desertification has affected 43 million hectares of land, whereas land reclamation programmes, like National Drainage Programme would cover upto 2 million hectares only.
(iv) Marine environment has been severely polluted by discharge of industrial and domestic sewage through the Malir and Lyari rivers and other sources, carrying in excess of 350 million gallons per day of effluents. Oily discharge is also contaminating seawater at the Karachi port and harbour.
(v) Per capita water availability in Pakistan is decreasing at an alarming rate.
(vi) The 1951 per capita availability of 5,300 cubic meters has now decreased to 1,200 cubic meter just touching water scarcity level of 1,000 cubic meter. Existing water resources are under threat due to rapid degradation, soil erosion, deforestation and untreated discharge of municipal and industrial wastes.
(vii) Majority of the population is exposed to the hazards of drinking unsafe and polluted water.
(viii) Less than 50 per cent of population has access to adequate sanitation, while around 60 per cent of urban solid waste is collected. No city has proper waste collection

and disposal system for municipal or hazardous wastes, causing contamination of soil.

(ix) Excessive use of pesticides has adversely affected biomass of agriculture land. Industry imports about 525 types of chemicals and dyes/colours for use in different processing, which generates toxic wastes posing potential risk to public health.

(x) Energy in-efficiency has become very high. While the 'Smog' seriously affects almost entire Punjab in December & January every year.

(xi) There is no national plan of disaster risk management to cater for environmental hazards, climate change and ozone depleting substances impacts.

(xii) Lack of institutional capacity with less emphasis on environment in government fiscal policies, and insufficient allocation of funds by provincial governments for protection of environmental areas of forestry, biodiversity, water and sanitation.

Environment matters greatly to those people living in poverty. This recognition has led to the formal adoption of poverty-environment linkages in the Pakistan Poverty Reduction Strategy, which makes explicit the links between environment to livelihoods, health and vulnerability of the poor. Poverty-environment linkages have to be at the core if Pakistan is to achieve Millennium Development Goals and the targets set for sectors like Water, Energy, Health, Agriculture and Biodiversity Framework at the World Summit on Sustainable Development.

The strategy of future environment conservation, management and use must be based on a three-pronged approach equitable sharing of benefits of environmental management, increasing community management of natural resources, and integrating environmental issues into socio-economic development planning to achieve sustainable development.

5. NCSA Implementation Process[6]

5.1 Management Arrangements

At the level of Ministry of Environment the NCSA project was managed by National Project Director (NPD, Annex- 5) and a designated Project Implementation Unit (PIU, Annex-6). A Team for Technical Assistance (TA, Annex-7) was recruited which worked closely with the PIU. The Ministry of Environment (MoE) is the National Focal Point for all key MEAs (Convention, Protocols and Agreements), therefore it acted as an executing agency for the process of NCSA. MoE is also responsible for overall implementation of the project in cooperation with other concerned ministries, provincial governments and line departments.

A high level Project Steering Committee (PSC, Annex-8) was constituted with a broad-based representation, reflecting the cross section of key government agencies with responsibilities covering various aspects of environmental and natural resource management. The PSC was chaired by the Secretary MoE. It is recommended to eventually setup a National Environmental Capacity Development Centre (NECDC) for providing capacity development support for all realms of environment at the federal and provincial levels.

A monitoring committee may be setup in MoE to oversee and monitor and advisory role to utilize institutional knowledge to all subsequent capacity building needs in the ministry.

[6] National Capacity Self Assessment of Pakistan, Inception Report, 2008

For NCSA project a project team was established in the ministry. The team included a project manager, a technical team leader, subject specialists in each thematic area, biodiversity, climate change and desertification, a communication specialist, IT specialist and a field coordinator. Besides this, other support staff was also available as and when required. The team was responsible to under take day to day management of the project including financial and reporting requirement.

Three Thematic Working Groups (TWGs, Annex-9) for each Convention were formed. Experts in the fields of biodiversity, climate change and desertification were nominated. Each TWG consisted of departmental heads or a senior technical staff of the relevant federal and provincial government agencies nominated by the concerned federal ministries and the provincial governments.

5.2 Approach and Methodology [7]

The consultants' Workplan outlining the key steps as well as the interim/final outputs is attached at Annex-8. The NCSA activities are briefly outlined in the following sections. As a process, the National Capacity Self Assessment has lead to present final report written in conjunction and through consultation with all major stakeholders in the concerned ministries, government departments, research organizations, university academics, civil society organizations, development organizations and all other relevant stakeholders (Annex-10). The methodology adopted for NCSA process has ensured ownership of the final outputs so that bilateral actions may be taken to find solutions to the environmental problems in question.

The main steps involved in the process are as follows:

5.2.1 Inception Phase Activities

- NCSA team mobilization
- Preliminary meetings with key stakeholders
- Review of available data
- Preparation of Workplan
- Submission of Inception Report

A three days presentation on NCSA plan of work was given to MoE/UNDP/TWGs in joint session in April 2008. A draft inception report was shared with the participants to seek their guidance and comments. After receiving feedback the inception report was finalized.

5.2.2 Stocktaking[8]

The stocktaking was a kind of situation analysis that provided the baseline information for the next steps of NCSA. This exercise was done to identify past and ongoing capacity development initiatives – capacity building programmes and projects and evaluate their strengths, weaknesses and lessons.

5.2.3 Thematic Profiles and Thematic Assessment[9]

[7] National Capacity Self Assessment of Pakistan, Inception Report, 2008
[8] National Capacity Self Assessment of Pakistan, Stocktaking Report, 2008
[9] National Capacity Self Assessment of Pakistan, Thematic Assessment Reports on UNCBD, UNFCCC and UNCCD, 2008

The foundation of NCSA is the thematic profiles, on which the work of assessing the country's capacity to deal with a situation is gauged. Three thematic profiles have been prepared: one each on climate change, biodiversity and desertification. During the assessment of these thematic profiles the constraints in each thematic area were identified, cross-cutting issues with impacts on each thematic area have been assessed and capacity implications recognized. Potential solutions for key capacity constraints were recorded. After completion, the three Thematic Assessment Reports were submitted to MoE.

5.2.4 Consultative Process[10]

Since stakeholder consultation is essential to a nationally owned and accepted NCSA, the NCSA team worked in consultation with key stakeholders throughout the process of preparing the final NCSA report. The consultative process has been initiated during the inception phase and entails detailed discussions with the potential stakeholders (Annex-11) identified during stocktaking.

5.2.5 Cross-cutting Analysis

The objective of the Cross-cutting Analysis is to assess capacity issues, needs and opportunities that cut across the conventions. This includes identification of common needs and possible synergies that could be achieved in the country by addressing requirements across two or more themes. This analysis may also identify capacity needs that are common to both national and global environmental management, and synergies between them. This step results in a list of priority national capacity needs and opportunities for synergies. It may also identify possible capacity development actions that can be refined for the Action Plan.

5.2.6 Preparation of NCSA Final Report/Action Plan

At the conclusion of the stakeholder consultation workshops and Thematic Assessments, the draft NCSA report and Action Plan was submitted. The draft NCSA report Action Plan circulated to potential stakeholders for review. This process allowed for a comprehensive review and further added to the full ownership of the NCSA outcomes and related Action plan. The stakeholder comments and feedback provided the basis for submission of the final NCSA Report and Action Plan. After this a National Dissemination workshop was held at Islamabad in May 2009 to share the outcomes of NCSA process and further build awareness among key stakeholders. The timelines of various activities are given in the workplan below.

5.2.7 Work Plan

No.	Activities Descriptions	Feb 08	Mar 08	Apr 08	May 08	Jun 08	July 08	Aug 08	Sep 08	Oct 08	Nov 08	Dec 08	Jan 09	Feb 09	Mar 09	Apr 09	May 09	June 09
1	Inception Phase																	
2	Stocktaking/ Thematic Profiles																	
3	Consultative Process																	
4	Thematic Assessments																	
5	Draft Final Report/ Action Plan																	
6	Final Report/ Action Plan																	
7	National Dissemination Workshop																	

[10] National Capacity Self Assessment of Pakistan, Report on Consultative Process

6. Major Findings

6.1 Major Findings for UNCBD[11]

6.1.1. Overarching Systems Overview and Systemic Capacity Gaps

(i) Laws Governing Natural Resource Management:

State agencies have traditionally relied on command and control, as opposed to market-based measures for affecting pollution and resource use. However, monitoring and regulatory institutions often lack the financial and technical resources to be effective, key factors in the failure of government policies. Moreover, many laws are imprecise or environmentally unsound; penalties too low; and coordination between different organs of the state is limited or absent. These factors were largely endorsed by the stakeholders during countrywide consultative process.

"Ecology" though mentioned in the Concurrent Legislative List, and despite the fact that Pakistan is a Party to majority of biodiversity-related international agreements, there does not exist any federal legislation on the conservation, development and sustainable use of natural resources. Federal statutes on the natural resources only regulate prospecting and exploitation of resources to ensure their continued availability for future exploitation. Most of the laws governing natural resources operate as provincial except laws related to marine fisheries that lie outside Pakistan's territorial waters, statutes governing the allocation of freshwater resources, and an act that prohibits cutting trees in strategic areas.

There is no federal legislation on protected areas except an ordinance related to establishment of protected areas in the Islamabad Capital Territory. The IEE/EIA regulations issued under PEPA empower the Federal Agency to designate "environmentally sensitive areas", with no guidance on how these areas would relate to provincially established protected areas. There is no provision for participatory role of communities in managing and conserving natural resources in federal legislation.

Most of the federal laws are lacking ecosystem management approach, emphasising only on administrative detail and fails to provide a sectoral framework for coordinating sustainable development with sustainable resource exploitation e.g., laws governing closely related resources, such as freshwater and fisheries do not provide for integrated management. Fisheries laws focus only on revenues for the state from marketable fish, and not on aquatic ecosystem including plants and non-fish animals.

Environmental laws in Pakistan only ensure the commercial objectives of natural resource exploitation in general. These Laws end to establish institutions and provide significant detail on how such entities are to be managed, but provide scant substantive content and do not provide for environmental considerations in conducting such activities. For example, the Agricultural Pesticides Ordinance contains no provisions regarding the effects of continuous use of a pesticide over long periods of time, or the regulation of its precipitation in the soil or groundwater. Similarly, the Mines Act covers all aspect of mining operations except for the safe disposal of waste, the mitigation of adverse environmental effects of mining and the issue of mine closure.

[11] Assessment of implementation of UNCBD in Pakistan at annex-12

The check on movement of biological material is made through separate departments which do not have a mechanism for coordination. The quarantine laws have a limited scope. Examples of this are that the checklist concerns diseased organisms only and there is no check on the introduction of invasive species. There is also need to revise the laws encompassing the linkages between animal, plant and Biosafety issues in order to implement Cartagena Protocol and other related post Rio Conventions.

Notable exceptions are laws on export processing zones, electric power generation and merchant shipping. Even so, environmental provisions in the statutes on export processing zones and electric power generation are vague and general, failing to provide clear guidelines or limitations. The most recent legal instrument regulating nuclear installations does not acknowledge similar authority given to the Federal Agency under PEPA to license, monitor and inspect installations and activities involving radioactive substances, nor does it provide for coordination of these functions. Meanwhile, environmental provisions in the law on export processing zones are discretionary rather than mandatory.

The Merchant Shipping Ordinance is more specific, referring to the provisions of an international agreement, while an amendment to the Karachi Port Trust Act obliges users of the port to ensure a pollution-free environment and makes them liable for clean-up costs. But even laws that are seemingly unrelated to natural resources could be used to encourage sustainable development and sustainable use.

Pakistan Environmental Protection Act (PEPA) though does not govern natural resources directly but affects them indirectly by providing a framework for controlling and mitigating pollution. In requiring environmental clearances for specified types of new projects and activities, PEPA can introduce environmental protection and natural resource conservation into sectors where existing laws do not otherwise provide for it. Effective implementation of PEPA's pollution control provisions and compliance with NEQS would contribute significantly to improving the quality of natural resources.

The EIA regime is limited to new projects. Existing activities, therefore, are not subject to its requirements and it does not deal with the cumulative effects of projects over time. The law does not make it mandatory for pollution charges levied on industry to be used to mitigate environmental damage or restore degraded resources. The provisions of PEPA are primarily reactive, although an environmental protection order (Section 16) may be used proactively. The law does not provide a framework for integrating its provisions with natural resource legislation, for example to ensure pollution-free water for fisheries.

(ii) Divided Federal and Provincial Legislative Jurisdiction

In Pakistan forests have remained under the legislative jurisdiction of the provinces since independence. The central government retains the power to legislate on "any matter" not specified in the legislative list in cases where "the national interest of Pakistan [...] so requires". In the Constitution of 1973, the subject of forests is not mentioned in either the federal or concurrent list, making legislation for the sector a provincial subject.

In the Constitution of 1973, fishing beyond territorial waters is a federal subject, but fishing and fisheries within territorial waters remains as a provincial legislative matter.

Fisheries in general, have remained a provincial matter since Independence. It is excluded from both the federal and concurrent lists of the 1973 Constitution. Under the Constitution of 1973, "shipping and navigation" is a concurrent subject, allowing both federal and provincial governments to legislate on matters that affect fisheries resources.

Wildlife is not specifically mentioned in either of the legislative lists of the 1973 Constitution, making it a provincial matter under the residuary rule. Besides wildlife protection, the "prevention of cruelty to animals" is listed as a concurrent matter in the 1935 Act. This subject appears in the provincial list of the 1956 Constitution and has subsequently remained a provincial matter, omitted from the federal list in the 1962 Constitution as well as both legislative lists in the 1973 Constitution. Similarly botanical & zoological surveys, protected areas, water and coastal areas & marine ecosystem management under the residuary rules fall under the jurisdiction of provincial governments as they are not mentioned in lists of the Constitution of 1973 of Pakistan.

Although legislative powers with respect to specific natural resources lie mostly with the provincial government, the Constitution of 1973 introduces the subject of "ecology" as a concurrent matter. In theory, this allows both the federal and provincial governments to legislate on natural resources in general, since all natural resources may be included in this category. In practice, the federal government has for the most part abstained from legislating natural resource conservation and use, except in cases that affect international trade or national security, or for matters considered to be of national importance. Legislative authority with respect to specific natural resources is largely under the exclusive purview of provincial governments.

Regardless of where legislative jurisdiction lies with respect to natural resources, treaties and agreements with other countries, including international conventions and declarations, have remained under the exclusive legislative authority of the federal government since Independence. Under the 1973 Constitution, making and implementing treaties, conventions, declarations and other agreements is a federal subject with no specific provision or exceptions related to implementing legislation. This allows the federal government to frame laws to implement its obligations under a wide range of international conventions and multilateral environmental agreements concerning the conservation of fauna, non-timber flora and migratory species; the trade in endangered species; the protection of wetlands; and the prevention of marine pollution. In doing so, the federal government could in theory address the gaps in other federal and provincial legislation governing natural resources.

The distribution of powers between the federal government and the provincial governments complicates the process of managing natural resources. For instance, the mining of nuclear substances and petroleum products lies within the exclusive domain of the federal government, while the management of natural resources and protected areas affected by such mining is most likely to be under the control of a provincial government. In the event of a conflict, federal law will prevail. Local government bodies have been given certain environmental and natural resource responsibilities, but there is no legal framework providing for coordination between local bodies, provincial environmental protection agencies and other authorities responsible for natural resources.

Usually there is no legal framework present, enabling public participation in natural resources management. Normally access to the information that is held by various government authorities, regarding natural resources and their management is denied to common stakeholder. The Pakistan Environmental Protection Act, 1997 obligates Pakistan Environmental Protection Agency (Pak-EPA) to "prepare and publish an annual National Environment Report on the state of the environment". It is therefore a legislative requirement for Pak-EPA to assess state of the environment and take stock of programmes, activities and projects executed to improve environmental conditions in the country. The first draft report on SoE was prepared in 2005 which not approved till todate.

(iii) Low level of Implementation of Biodiversity Action Plan (BAP)

As signatory to UNCBD, Pakistan responded to its obligation endorsing the global priority accorded to biodiversity conservation and its sustainable use by preparation of Biodiversity Action Plan. The overall goal and objective of Biodiversity Action Plan was "to promote the conservation and sustainable use of Pakistan's biodiversity, and the equitable sharing of benefits arising thereof, for the wellbeing and security of the nation. Unfortunately the BAP targets could not be achieved substantially due to many reasons at systemic level such as, Absence of biodiversity law, biodiversity policy, lack of political will, biodiversity laws/policy, poor financial mechanism, poor implementation of environmental laws, low level of technical capacities of BAP implementing agencies/institutions especially Biodiversity Secretariat, Provincial Wildlife Departments, Forest Departments, Fisheries Departments, Agriculture and Livestock Departments, poor coordination among ministries and departments at federal as well as provincial level, lack of awareness among stakeholders and absence of accountability mechanism.

(iv) Identification and Monitoring of Components of Biological Diversity

For conservation of biodiversity and its sustainable use, the identification and continuous monitoring of its components is very essential. Pakistan exhibits limited capacity in this regard. In absence of biodiversity laws and national policy there exists an information gap and lack of clear guidelines for this important component of UNCBD. There is no national programme for identification and long term monitoring of components of biodiversity in Pakistan.

(v) In-situ Conservation:

Lack of ecosystem conservation approach in environmental laws has been identified as major gap. Proportionally too much emphasis is placed on species conservation approach apparently due to low appeal of ecosystem approach. In the absence of ecosystem approach, buffer zones corridors should be established in and around the protected areas. Necessary amendments in the laws should be made in this respect.

Due to high cost of conservational efforts and poor management systems, the institutions especially provincial Wildlife Departments, Forest Departments, Fisheries Departments, Agriculture Departments and livestock Departments do not have capacities to adopt modern conservational methods for in-situ conservation. Political influence and activities of land mafia also hampers such efforts.

Though a system of protected areas exists in Pakistan but management plans either do not exist or not implemented. The rehabilitation and restoration plans of degraded ecosystems and threatened species do not exist.

(vi) Ex-situ Conservation

Zoological Gardens, Wildlife parks though exist in Pakistan where ex- situ conservation is being made, but the capacity of such entities is very low. Therefore these institutions are not able to breed the threatened species for ultimate release in the wild .Ex-situ conservation needs to be given priority and institutions involved should be strengthened with expertise and equipment.

(vii) Environmental Impact Assessment of Developmental Activities

Despite the fact that Pakistan has made sufficient progress with respect to environmental legislation and policy framework, the government institutions have failed in implementation of these laws/policies. Due to many factors which include lack of political will/commitment and proper monitoring and accountability mechanism and poor capacities of law enforcing agencies/line department especially EPA and EPD the Environmental Impact Assessment studies are not properly handled and mitigation options seldom monitored.

The EIA process for the public and private sector projects, besides being advocated by numerous civil society organizations and judicial protection in some cases, was seen moving at a slow pace and that too with inadequate expertise and weak public hearing process. The use of environmental safeguards and integration of the principles of sustainable development is one approach that could maximize development results with least negative impacts on the natural resources and the poor. The use of tools as Strategic Environmental Assessment (SEA) and Environmental Fiscal Reform (EFR) to mainstream environment in our country would be a step in right direction.

(viii) Access to Genetic Resources/Bonn Guidelines

Bonn Guidelines on access to genetic resources and fair and equitable sharing of the benefits arising out of their utilization are a source of reference while working for the drafting of the legislation on ABS, A Biodiversity Working Group has been constituted in the Ministry of Environment that is working on the draft legislation on ABS. A project has been prepared for the implementation of Bonn Guidelines (BG) in Pakistan, this is a first step in this direction, and no other work has been done for Bonn Guidelines so far.

Absence of Laws related to access to genetic resources (ABS) and insufficient present proprietary laws do not fulfil requirements of sustainable use of biodiversity which has resulted in overexploitation of natural resources. No such mechanism exists in Pakistan so as to implement Article 15 of UNCBD and Bonn Guidelines. There is no focal point made to coordinate/facilitate the implementation of Bonn Guidelines.

(ix) Clearing House Mechanism (CHM)

Obligatory to Article 18 paragraph -3 of the UNCBD, to promote and facilitate technical and scientific cooperation and disseminate information on policy and management issues relevant to the implementation of the Convention, Pakistan is required to designate a CHM national focal point and make it operational as soon as possible. The MOE has though designated the national focal point of CHM but due to limited capacity it is unable to coordinate with the national and international institutes including the UNCBD

Secretariat to promote and facilitate the technical & scientific cooperation. In this regard no serious effort has been taken so far.

(x) Cartagena Protocol on Bio-safety

Article 8(g) and Article 19, paragraph 3, provides to take appropriate procedures to enhance the safety of biotechnology for reducing all potential threats to biological diversity as well as risks to human health. Ministry of Environment in collaboration with the relevant institutions in Pakistan (NIBGE, CAMB and NARC) prepared Bio-safety Guidelines. These guidelines were approved by the high levelled Bio-safety Coordination Committee IBC. The Cartagena Protocol on Biosafety was finalized and adopted in January, 2000. Pakistan has signed and ratified it.

Pakistan has low level of systemic capacities to assess and ensure prevention or reduction of the risks to biological diversity due to development, handling, transport, use, transfer and release of genetically modified organisms (GMOs). There is no mechanism developed for scientifically sound use of GMOs and Risk Assessments. Due to lack of expertise in the Forestry Wing of the MOE, this subject was transferred to Pakistan Environmental Protection Agency, where a Project on Bio- safety is presently under implementation.

(xi) Medicinal Plants

An estimated 80% of the rural population of Pakistan depends on traditional medicines, for their primary health care needs, a majority of which use plants or their active principles. The Tibbi Pharmacopoeia of Pakistan (A pharmacopoeia of traditional drugs compiled by the Tibbi Board) has listed around 900 single drugs and about 500 compound preparations made out of medicinal plants. The capacity gaps for conservation and sustainable use of medicinal plants have identified. In absence of Access Benefit Sharing Laws (ABS) these medicinal plants are being over exploited for commercial purpose.

(xii) Global Taxonomic Initiative (GTI)

Global Taxonomy Initiative (GTI) is an important programme of UNCBD and was established by the 5th meeting of the Conference of the Parties to facilitate international cooperation and to coordinate activities on matters pertaining to the implementation and development of Global Taxonomy Initiative (GTI). Pakistan is obligatory to undertake the priority activities including the national taxonomic information requirements, assessments of national taxonomic capacity to identify taxonomic needs including the identification of taxonomic tools, the building of taxonomic capacity in the country. So far Pakistan has made no progress for GTI. There is no designated National Global Taxonomy Initiatives focal point.

There is an inadequate pool of taxonomic experts and support staff with dwindling prospects for the replacement of aging personnel. There is a dire need to address the demography of taxonomic expertise & provide employment prospects and training for younger staff.

(xiii) Global Strategy for Plant Conservation

In order to halt the current and continuing loss of plant diversity, during the fifth meeting of the UNCBD, a global strategy for plant conservation was established and sixth meeting adopted it. Pakistan has yet to develop national target to incorporate them into relevant

plans, programmes and initiatives including national biodiversity strategies and action plans. There is a need to develop capacity in order to implement this strategy in the country. The financial mechanisms to the implementation of the strategy are available which can be tapped.

The Strategy will build upon the knowledge, innovations and practices of indigenous and local communities, with the approval and involvement of the holders of such knowledge, innovations and practices and contribute to implementation of Article 8 (j) of the Convention. It will also apply the Convention provisions on access and benefit sharing consistent with the International Treaty on Plant Genetic Resources for Food & Agriculture, ecosystem approach, in situ & ex-situ conservation measures, including the restoration programmes. It also sets targets for conservation of plant diversity. Pakistan has taken no direct initiative to implement this strategy. No National targets on plant conservation have been made so far.

(xiv) Global 2010 Biodiversity Targets

The Conference of Parties (COP) in its decision VI/26, adopted the strategic plan for the UN Convention on Biological Diversity (UNCBD). In this plans the parties committed themselves to a more effective and coherent implementation of the three objectives of the Convention, to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on earth. The 2010 Biodiversity target was subsequently endorsed by the world summit on Sustainable development and the United Nations General Assembly at the 2005 World Summit. The 2010 Biodiversity target is one of four new targets being incorporated into the Millennium Development Goals. Later the Conference of Parties, in its decision VII/30, adopted a framework to facilitate the assessment of progress towards achieving the 2010 Biodiversity Target and communication of this assessment, to promote coherence among the programmes of work of the Convention and to provide a flexible framework within which national and regional targets may be set and indicators identified.

The framework was further refined through decision VIII/15. The framework included seven focal areas, which include i) Protect the Components of Biodiversity, ii) Promote sustainable use, iii) Address threats to biodiversity, iv) Maintain goods and services from biodiversity to support human well-being, v) Protect traditional knowledge, innovations and practices vi.) Ensure the fair and equitable sharing of benefits arising out of the use of genetic resources and vii) Ensure provision of adequate resources. There is a key capacity constraint to develop and implement Global 2010 Biodiversity Targets and their indicators. The continuity of efforts to achieve such targets is another major challenge.

(xv) Access to financial resources

The present financial mechanisms involves too much beaurocratic hurdles. There is a lack of awareness of international funding sources. There are low capacities to approach financial institutions. International funding mechanisms, e.g., GEF funding system is too complicated for majority of institutions having low capacities even for making project proposals of international standards.

Though the training courses have been held in Pakistan involving GEF such courses should be held regularly so that the institutions/ experts , particularly govt. institutions could tap GEF and other donor assistance for biodiversity projects.

(xvi) Implementation of Pre- Rio Nature Conservation Conventions

Pakistan has tried its level best to implement the Pre- Rio Conventions including the Convention on International Trade in Endangered Species of Wild Fauna & Flora (CITES), Convention on Wetlands of International importance (The Ramsar Convention), Migratory Species Convention (CMS) and succeeded to a greater extent. However Pakistan has to do more to implement these conventions and contribute significantly to save the endangered biodiversity from further deterioration and protect the habitats. Unfortunately Pakistan's capacity to implement these conventions at the local, national and international levels is not sufficient. It has been assessed at three levels.

The national legislation to implement these conventions is lacking. In the absence of Endangered Species Act, for the control of CITES species, Pakistan is depending on the imports & export Statutory Notifications, which do not fulfil the requirement. The Endangered Species Act has recently been drafted and approval of the government is in process. Custom Officers are not able to identify the wild animals/ endangered animals and therefore the import & export of endangered animals can not be checked. Wildlife officers can not be posted with custom officers at the International Exit & Entry points as there is no provision in the Custom Act, 1969. Necessary amendments have to be made in Customs Act in this respect.

(xvii) Invasive Alien Species

The issue of the invasion by the alien species has a recent recognition in Pakistan. Some efforts to identify and enlist some of the known problematic species have been made but no cataloguing of alien invasive species or their impact on the local environment is available at national level. Assessment has been done only for some alien species of concern. There is no tracking system developed for invasive alien species.

There is no mechanism developed for international cooperation, including the exchange of best practices for control of alien species. The use of ecosystem approach and bio-geographical approaches is not present for controlling the invasive alien species in different parts of country. Quarantine measures are adopted at the ports of entry in Pakistan only. The concerned officials require training in this regard. They critically lack the knowledge and proper education for implementation of quarantine laws.

The Biodiversity Action Plan (BAP) of Pakistan deals with alien species problem very superficially. The action 6.6 of BAP reads as; "Take measures to control invasive alien species of fauna and flora, and to prevent further introduction". Furthermore, in order to address the issue of invasive species, in "National Environment Policy-2005" under sectoral guidelines on Biodiversity and Protected Areas, it is mentioned that the government may; "prepare a national strategy and action plan for combating spread of invasive species" but no such action plan has been prepared so far.

(xviii) Inadequate Capacity for Participation in UNCBD Meetings

Like other international conventions, the UNCBD meetings are attended by govt. delegates. Normally financial assistance is arranged by the Convention Secretariat for only one delegate. The nominations for Pakistan delegates are made from the Ministry or its attached/ subordinate departments. Such nominations are normally made close to the meetings and nominated delegates do not have the time to make necessary preparations for the meetings due to their inoccupation in other works. Very rarely the NGOs arrange consultation meetings for assisting in taking Pakistan's position. However due to non-representation of government in such consultations the positions are not acceptable to the govt. More over many meetings are simultaneously being held during COPs and Adhoc Working Group Meetings and due to one man delegation, Pakistan is unable to be represented in many important meetings. It is therefore desired that Pakistan should send sizeable delegations after the necessary consultation process. Necessary funding should be made provided /arranged by the government of Pakistan.

6.1.2 Capacity Gaps at Institutional Level:

(i) Lack of Operational/Infrastructural Capacities

Although a strong institutional mechanism exist in Pakistan but poor operational and infrastructural capacities, undefined mandates with respect to UNCBD, insufficient trained / educated staff and financial resources and lack of new technologies, field logistics, poor incentives for scientific trained staff, absence of centralized critical database and poor capacities of project formulation and implementation especially in Wildlife Departments, Forest Departments, Fisheries Departments, Agriculture Departments and livestock Departments and other public sector research institutes and academia are the main root causes for poor implementation of Convention in general and BAP in particular.

Establishment of a Biodiversity Secretariat was recommended in BAP to oversee & monitor the implementation of BAP & CBD, It was established late in 2005. However the capacity of Biodiversity Secretariat still remained inadequate due acute shortage of technical human resource infrastructure and appropriate funding. Presently only one officer is working in the Biodiversity Secretariat. In the absence of a strong Biodiversity Secretariat a large number of long and short-term actions of BAP are yet to be implemented.

(ii) Low level of Trainings

Regular trainings of staff associated with Forest and rangelands management, Wildlife management, Fisheries management, Livestock management and Agriculture include some basic knowledge about Biodiversity. Research in these fields is also partially oriented towards the conservation and sustainable use of Biodiversity. However, no regular system of trainings that is measurable, time bound and quantifiable is in place. Allocation of funds for such training programmes is insufficient. Infrastructure, laboratory facilities are seriously lacking within concerned government departments. Funds for maintenance of equipment are not available. Although many workshops, seminars, training programmes are regularly organised in the relevant institutions in collaboration with NGOs like IUCN, LEADS and WWF etc. but their impact is not visible.

In this regard mechanism for international cooperation is also in place and many counterpart training programmes with international organisations and institutions are being implemented. However due to socio-economic conditions in the country brain drain has become another serious problem since last few decades. Therefore, the departments and institutions that are responsible to carryout necessary research work for identification and conservation of components of biodiversity are seriously lacking trained and motivated human resource besides sufficient financial resources. Another issue identified is lack of career planning and proper incentives for researchers due to which there is lack of motivation for work.

(iii) Lack of New Technologies

There are minimum funds available with the institutions for gaining new technologies which are required for conservation of biodiversity. This is one of the main hurdles due to which capacities of the concerned departments and institutions cannot be built. Secondly maintenance of such equipments which are essential for conservation and monitoring of biodiversity components also requires technical skills and lots of fund which are not available.

For effective monitoring of components of biodiversity, modern inventory facilities and expertise especially taxonomic experts are lacking in related federal and provincial departments.

The protected areas of Pakistan cover often a vast area which is difficult to manage due to lack of financial and human resources. The present strength of staff associated with PAs is insufficient and their technical capacities are low. The divided jurisdiction of protected areas, lack of awareness of junior staff about importance of conservation and corruption are also critical issues in managing protected areas.

For Ex-situ conservation, absence of scientifically managed botanical and zoological gardens at national, provincial and regional level is a core issue. Existing facilities are lacking basic requirements like technical staff, infrastructure and sufficient financial resources. The existing Zoological Survey Department working under MoE has a very low capacity in terms of technical human resource, funds and ex-situ conservational expertise.

Similar situation exists in EPAs and EPD which is responsible for poor implementation of IEE and EIA. EPAs across the country have poor monitoring facilities and acute shortage of technical human resource to evaluate EIA reports. A low level of capacity in provincial line departments and research organization has been assessed to implement Cartagena Protocol.

To implement Global Taxonomic Initiative (GTI) the institutions such as PNHM, ZSD, National Herbarium (NARC) and the Zoology & Botany departments of universities and colleges where in the taxonomic collections are maintained needs necessary equipment and modern methods for collection of species and technical experts. Financial and administrative support is provided for such research work to some extent but for extensive research more financial resources and incentive should be provided. Facilities for such field works in distant and remote areas of the country are often insufficient and require allocation of additional funds. Although at international level some collaboration exists between academia and research organizations on taxonomy but there is very little

coordination seen at national level. The research results are hardly available and usually disseminated in forums outside the country and are not easily accessible.

The capacity of National Council for Conservation of Wildlife (NCCW) which is functioning as Management Authority of CITES is low to implement the CITES. Similarly the capacities of Zoological Survey Department (ZSD) and Pakistan Forest Institute (PFI) which are working as Scientific Authorities for Fauna & Flora respectively under CITES, are also low in terms of expertise, equipment, funds etc. Further, NCCW being the focal point for Ramsar Convention and Migratory Species Convention is responsible for initiating measures for Wetlands of international importance and initiate actions for the protection of wetlands, will have to be vigilant on status of wetlands of international importance where ecological changes are occurred due to natural or man- made activities.

6.1.3 Capacity Gaps at Individual Level:

At individual level lack of awareness of UNCBD and national obligations, limited job incentives, lack of educational opportunities in specialized fields of biodiversity, limited training opportunities and rapid transfers to other departments/stations were identified as serious obstacles in implementation of UNCBD and BAP. There is lack of experienced human resource while present strength of technical staff in most of the institutions at federal level e.g., NCCW, ZSD, NARC, PMNH, NIO and provincial Wildlife, Fisheries, Forestry, Agriculture & Livestock departments and other research organizations is overburdened and lacking basic facilities.

There are very little job opportunities and incentives for taxonomist in the country. Therefore researchers/students do not opt for taxonomy as a subject in universities. In Pakistan herbaria, zoological collections, museums exist where large number of taxonomists served these organizations but gradually retired or left the organizations for better prospects.

At Individual level another serious capacity gap identified, is the low level of negotiating skills of environmental managers and policy makers at international level and for representation of Pakistan at COPs and MOPs. Experts normally involved in preparation of project documents are those who are not directly involved in conducting appraisals with the stakeholders. To access international funding for conservational efforts in the country the capacities to prepare the project documents of international standards is very low.

6.2 Major Findings for UNFCCC[12]

6.2.1 Overarching Systems Overview and Systemic Capacity Gaps:

(i) The system of governance, policy design and implementation as a whole lacks capacity to integrate its subsystems and their components into a cohesive, collective, integrated, organized and unitary whole. Our political, economic, technical, social and cultural systems do not fit well with each other. They should mutually reinforce each other so as to give rise to a strong, healthy and robust system of policy and decision making capable of leading to-wards sustainable development and nature conservation. The

[12] Assessment of Implementation of UNFCCC in Pakistan at annex-13

subsystems and their components also lack integrity i.e. common purpose and goal seeking characteristics. It needs to be noted that Climate Change is not only a country wide but a global phenomenon which requires not only nationally well knitted and integrated systems but also their synchronization with global systems.

(ii) UNFCCC was adopted in May, 1992 and came into force in March, 1994. Pakistan was quick enough to sign UNFCCC in June, 1992 and ratify it in June, 1994. Despite this initial enthusiasm in joining the global community in combating Climate Change, little effort has been made over time to strengthen national systems to meet the challenges of Climate Change on a sound footing. Technological capacity of the country is still too low to fully comprehend and address the complex issue of Climate Change.

(iii) Climate Change is a global phenomenon but it will impact various parts of the planet unequally. Pakistan belongs to the category of regions which will be worst hit by Climate Change. Pakistan will experience severe direct and indirect negative impacts of Climate Change. The direct consequences include reduction in crop yields, shortening of growing cycles of crops; increased evapo-transpiration, surge in insects, pests, viruses, bacteria and diseases. Other adverse effects may include floods, droughts, glacial melt and glacial lake bursts, water logging, salinity, desertification, and loss of vital biodiversity. This is an alarming situation which calls for very efficient and effective national system capable of not only arresting the increasing Green House Gas(GHG) levels through mitigation measures but also to take remedial measures through adaptation strategies. We may need to re-adjust societal living according to changed living conditions caused by Climate Change. It is important to note that, even if further Climate Change is stopped in the near future, the loss incurred thus far would require a great deal of adaptation measures in our socio-economic system and its component subsystems of water management, agriculture, energy production and consumption, deforestation and a-forestation equilibrium, biodiversity conservation, health, housing, industrial pollution and chemicals management etc.

(iv) There is an urgent need to create national capacity to adopt a total system's approach to study, mitigate and adapt Climate Change. This entails a process of holistic investigation, research, logical analysis and problem solving instead of fragmented and compartmentalized analysis and policy making in different subsystems. We need to take a holistic view of complex and dynamic inter-relations and interactions among various national subsystems that give rise to the whole governance systems for addressing global warming and Climate Change.

(v) National policy formulation and implementation:

a. Weak Policy Implementation

Several policies, laws, rules and regulations have been successfully formulated in last several years by Ministry of Environment e.g. National Environment Policy, Pakistan Environmental Protection Act 1997, National Environmental Quality Standards (NEQs) etc. However, implementation has been very weak due to insufficient and ineffective governance system in addition to fragile and fragmented institutional framework.

b. Lack of Policy on Climate Change

There is pressing need of developing a National Climate Change Policy. Ministry of Environment has considerable experience of developing environment related policies and has some capacity to develop a climate change policy. However, this exercise, to be fruitful, needs to be lead and managed by technical experts having multi-disciplinary training and inter-disciplinary system's approach to policy making.

(vi) Technology:

a. Fragile National Science and Technology Apparatus

National Science and Technology apparatus is fragile and fragmented. It needs to be substantially strengthened. New institutional infrastructure equipped with world class management systems need to be created to respond to the technological needs of 21st century including the complex issue of Climate Change.

b. Lack of Institutional Infrastructure

The phenomenon of technology development, transfer, acquisition, adoption, adaption and assimilation needs to be studied in depth. Necessary institutional infrastructure need to be developed. The provisions of technology transfer under UNFCCC, Kyoto Protocol and Bali Road Map need to be understood and provoked in national interest.

(vii) Funding:

National capacity to fund Climate Change Combat Projects (CCCPs) is not only low but its funding mechanisms and fund disbursement methods are also very feeble, frail and full of flaws. The international mechanisms such as GEF are also complicated and lengthy in procedures resulting in suboptimal utilization by developing countries like Pakistan. The Adaptation Fund created under COP decisions of UNFCCC and MOP decisions of Kyoto Protocol has not become fully functional despite several pledges by the Parties to the Convention. Pakistan as a member Group of 77 may try to use pressure of the Group to make this fund operational as soon as possible and to make it simpler and user friendly. The requirement for a Global Technology Transfer Mechanism at costs affordable to developing countries also needs to be emphasized.

(viii) Incentive system:

a. The National incentive system does not encourage investment in clean production and consumption of energy and consumer products; preservation and conservation of natural resources; and adoption of mitigation and adaptation measures against Climate Change.

b. Preparation of CDM projects is very complicated and knowledge intensive. Pakistan lacks capacity to develop good projects in plenty and hence is missing several good opportunities. The approval process of CDM Executive Board is also very complex and lengthy which needs to be simplified.

(ix) Climate Change Negotiations Capacity:

The decisions of Bali process are likely to significantly influence growth, technological capacity, trade competitiveness and quality of life in Pakistan and other countries. The negotiations under Bali Road Map and the Copenhagen process are technically complex, humanly intense and politically brutal because the out come would directly and vitally affect the economic and social future of every country. We may have to encounter undue pressure to accept onerous and unfair commitments to cut GHG emissions compromising

our development tempo. International technology market may become more skewed, imperfect and oligiopolistic for developing countries.

The Climate Change negotiations may also be used by some industrialized parties to neutralize, to the extent possible, the economic and trade competitiveness of some developing countries. New environmental conditionalities such as tariff concessions to new "environment friendly" goods produced by developed countries and trade restrictions against so called old technologies, goods, and services etc acquired by developing countries at high costs may be imposed. This will have serious adverse impacts on our weak economy and already slow export growth. In such a competitive negotiation atmosphere, Pakistan's negotiations management capacity is extremely limited and the system of selection and development of negotiators is full of weaknesses and flaws. The nominations for negotiation teams are made arbitrarily and composition of teams is changed frequently.

(x) Pakistan's food security, water security, and energy security are at serious risk due to Climate Change. The capacities of Pakistan's national systems have to be substantially enhanced to respond to these challenges to national security.

6.2.2 Institutional Capacity:

Significant institutional setup has been created in Pakistan. Federal Ministry of Environment is the lead agency. The Ministry has an environment wing, International Cooperation Wing, Forest Wing, Development Wing and Administration Wing. Pakistan Environmental Protection Agency (Pak- EPA) and provincial EPAs /EPDs are in place. Pakistan Metrological Department is well established. Ministries of Agriculture, Water and Power, Petroleum and Natural Resource, Health, Communications, Transport, WAPDA, Alternate Energy Development Board are seasoned institutions. However, they need re-orientation towards Climate Change mitigation and adaptation. Climate Change related capacity has to be built and strengthened in these and other related institutions.

Global Change Impact Studies Center (GCISC) is the only organization working exclusively on scientific dimensions of climate change. Multilateral Environmental Agreements (MEAs) Secretariat of the Ministry of Environment is working for enhanced implementation of obligations of various international conventions including UNFCCC and Kyoto Protocol with very limited resources. Provincial Forest Departments and Universities need major capacity overhauls vis-a-vis climate change. Pakistan Forest Institute needs to focus on issues of Biodiversity, Deforestation, A-forestation, CDM etc with respect to Climate Change, UNFCCC and Kyoto Protocol. All these institutions have capacity gaps in their structures, mandates, rules, regulations, decision making and management processes, technical human resources, national and international funding mechanisms.

6.2.3 Capacity Gaps in Individual Persons:

The capacities of individuals are derived and propelled by the capacities of systems and institutions. The weak systemic and institutional capacity can not warrant strong individual capacities except in a very discrete manner and on exceptional basis. The NCSA exercise has clearly indicated general capacity deficit in the individuals as can be inferred from their contributions during rather extensive consultative process through various tools and techniques such as questionnaires, semi-structured interviews, focused group discussions

etc. The cooperation of certain knowledgeable persons is, however, fully acknowledged and held in high esteems.

There is no regular system of public education on environmental issues in general and climate change in particular in Pakistan.

6.3 Major Findings for UNCCD[13]

6.3.1 Overarching Systems Overview and Systemic Capacity Gaps:

(i) Policies/laws

The policies and laws related to natural resource management are made in isolation with the other sectors, e.g., land degradation and desertification issues and its impacts are not reflected and taken care of in policies of other sectors like water, agriculture, forestry, livestock, energy etc. There is insufficient participation of beneficiaries at grassroot level in the policy making and planning process. Provinces are poorly involved in this process. Generally there is a low level of awareness of land degradation and desertification issues among planners and policy makers.

In the 1970s, Pakistan abolished the "Sardari System", an indigenous system of communal property management and introduced an alternate system of state ownership of uncultivated land. This system is based on exclusionary principles, which places restrictions on utilization of resources by local communities. State management is weak and lack of ownership or tenure rights leaves little incentive for communities to protect and utilize natural resources sustainably.

The rights of local communities on use and responsibilities for conservation of natural resources are poorly defined, e.g., land tenure rights are not well defined. Political instability, divided jurisdiction over natural resource management, weak law enforcement, penalties and complicated procedures in forest areas, low level of capacity of law enforcing agencies are other issues which needs to be addressed. Political influences have affected the working of the Forest Departments badly. There is a serious lack of coordination among provincial line departments and federal agencies.

Policy and institutional reforms recommended in most of the reports have not been attempted in the true sense due to lack of political commitment or change of governments. The loss of institutional memory due to rapid transfers hampers development in environment sector especially in policy making and implementing institutions. National Rrangeland Policy is absent.

The mechanism for transforming policies into strategies/guidelines/action plans and policy review/analysis based on goals and targets is poor. The absence of adequate land use policy/planning is a major barrier in sustainable management of land resources. Clearing of forest areas for other land uses, especially agriculture, development of infrastructure, roads, settlements and housing schemes, encroachment on state forest lands/land mafia activities are major issues in this regards.

[13] Assessment of implementation of UNCCD in Pakistan at annex-14

Poorly developed early warning and forecasting systems for drought and flood, Tsunamis and other natural hazards are another capacity gap identified which needs to be translated in to existing policy framework. There is a Lack of legislation on groundwater utilization.

Natural resource management policies have failed in controlling overharvesting of natural resources especially fuelwood, for the livelihood by communities. There is lack of opportunities for alternate sources of earnings and initiatives for development of new skills especially in mountain areas, deserts and coastal areas. There is a little access to cost effective alternate/renewable energy resources.

The subsidized electricity tariff (flat rate) has been introduced nationally to encourage farmers to increase agriculture production. This tariff promotes poor use of scarce water resources in dry lands, especially in Balochistan where farmers do not invest in improving irrigation efficiencies of their tube-wells. In Balochistan, poor farmers who cannot invest heavy amounts in thatching water from lower water tables often abandon their lands. Such land is often left open to free-grazing, removal of existing vegetation for firewood, and removal of top soil for land development at sites where water is available. Continued unsustainable mining of ground water and consequent abandonment of land will cause further desertification in dry land areas.

The absence of adequate land use planning and supporting legislation is a major barrier in sustainable management of land resources. Land use planning has never been high on Pakistan's agenda. In fact, there have been only a few sincere attempts for localized land use planning. Islamabad, the capital of the country, is the only city which has a proper land use plan.
The centralization of the control over forests, the lack of involvement of local communities and disincentives to communal investment towards sustainable management of the forest resource have greatly eroded these traditional management systems. Traditional customary laws for natural resource management should be reintroduced where possible.

No mechanism for conducting policy reviews exists in Pakistan. There is a need to develop multistakeholder fora at federal, provincial and local levels to carry out policy reviews. Such fora will also help in resolving conflicts between the provinces and the federal government related to issues such as taxes on inter-provincial movement of timber, compensation for watershed protection, compensation for the negative effects of the ban on timber harvesting in protected areas, conflict between various federal agencies and conflict between the energy sector and biodiversity conservation.

In the past, forest policies have been prepared in isolation from wildlife, fisheries, tourism, agriculture, education, population planning, water and the energy sectors. There is a need to develop close linkages with other sectors for sustainable resource development. Extra-sectoral influences are not considered in formal forest policies.

There is insufficient capacity to incorporate provisions of the UNCBD and the UN Framework Convention on Climate Change into forest policies. Mostly foresters have poor understanding of issues related to forest biodiversity, management of forests as carbon sinks, international trade in forest products, and forest certification; as such they are inadequately reflected in forest policy contents and processes.

There is no consensus on the definition of Sustainable Forest Management (SFM). The lack of criteria and indicators for the management of forests in different ecological zones is problematic. The existing forest classification is based on the 1935 description and classification. There is a need to undertake an ecosystem-based classification according to the accepted international system.

Stakeholders (local communities, other government departments, NGOs and biodiversity specialists) are not involved in the preparation of management plans. The subject of invasive and alien species has not been covered in earlier forest policies.

In privately owned guzara forests, the owners often have to contend with the needs of untitled holders or tenants. Uncertain property rights discourage tenants or landless and nomadic grazing communities to protect and conserve forest and land resources. Many forest areas managed as common property have become openly accessible.

(ii) Lack of funds

There is no institutionalized innovative financial mechanism present to upscale investment in sustainable land management. Policies are approved but the proper institutional framework and resource allocation required for implementation of policies is mostly lacking. There is limited allocation of funds for R & D activities and new technologies which have usually very high costs. Budget allocation made for even those activities and programs which were initiated, as per recommendations, are curtailed during the implementation stage due to shift in priorities, to divert funds to other projects/schemes considered important by the government.

(iii) Early Warning and Fore- casting Systems

The capacity in meteorological services of the country is weak and underdeveloped. Meteorological Department distributes reports to government organizations and media. This information does not reach the people in rural areas who are likely to be affected by drought. Early warning systems should aim at picking up the forecast information by the government agencies and its dissemination to communities through NGOs/CBOs. With traditional systems of using indicators of seasonal forecast, the climate information through EWS can enable the farmers to increase production in high rainfall years and avoid losses in low rainfall years.

(iv) Systematic Observation of Land Degradation/ Desertification

There exist capacity gaps in dedicated and coordinated forest information system/ GIS-based forest resource accounting and monitoring system to assess the extent and impact of desertification at provincial or national level. There is insufficient quantitative data on current land use in arid and semi-arid regions, rangelands, degraded ecosystems and ecosystem-based classification according to the accepted international system is lacking.

(v) Training of Managers and Decision Makers

The negotiations under COPs, MOPs and other international forums related to UNCCD are technically complex and often have serious political and regional impacts. In such intensive negotiations, the capacity of Pakistani environment managers and decision makers who take part in such international meetings is extremely limited and the system of

selection and development of negotiators is full of weaknesses and flaws. The nominations for negotiation teams are made arbitrarily and composition of teams is changed frequently. Due to rapid transfers the institutional memory is lost.

(vi) Lack of Education and Public Awareness/training

There is no national programme for awareness/education and training at community level of conservation practices for sustainable use of natural resources and introduction of new technologies for irrigation efficiencies, crop management, agro forestry, salinity control and alternate energy sources to minimise use of fuelwood. Lack of knowledge of new emerging technologies introduced by other countries and effectively used for sustainable land management and little exposure of related researchers to ongoing activities related to SLM are major capacity gaps.

6.3.2 Capacity Gaps at Institutional Level

The sectoral canvas of UNCCD is extremely broad involving all institutions concerning with land management, land reclamation, soil conservation, water resources, irrigation, forestry, agriculture, range and livestock, meteorology and drought management, social and financial sector institutions, both governmental and non-governmental operating in deserts and dryland areas. All these institutions are involved in research and monitoring in line with implementation of UNCCD and NAP.

Pakistan has established a strong institutional mechanism required for implementation of UNCCD and NAP but lack of capacity exists in many areas. The planning process for preparation of project documents i.e. planning phases like project identification, formulation and appraisal are not normally followed. There is insufficient participation of experts especially in multi-dimensional and integrated environmental projects. There is insufficient participation of beneficiaries in the planning process because the experts involved in project planning have strong assumption that they are the best judges of project interventions. PC-I has to be followed strictly and process of modification is extremely difficult. The rigid approach is one of the major limitations for effective implementation of the development projects.

Loss of institutional memory due to rapid transfers is yet another key issue which is hampering development in environment sector especially in policy making and implementing institutions. Usually non professional people are dealing with issues related land degradation and sustainable natural resource management. With passage of time till they get some knowledge and experience through some internal or external trainings/exposure to other institutions, they are transferred to other irrelevant sections or departments or ministries. Usually in ministries like MoE which are coordinating with highly technical and professional institutions /organizations at national as well as international level, are seriously lacking qualified people in subjects related to environment sector resulting in poor understanding of the issues. Ultimately this leads towards failure in implementation of environmental laws and policies. That is one of the main reasons for continuous deterioration of natural resources in Pakistan. Efforts should be made to replace non professional officers with subject specialists at ministries like MoE and MINFAL. This very will improve the performance of such ministries many fold.

Another capacity constraint identified is the inter-agency linkages and cooperation which could not be established as envisaged in the NAP and required by Convention for its

implementation. Most of the institutions are implementing their projects in isolation resulting some time in duplication of efforts. There is a need of close cooperation between implementing agencies.

In many cases budget allocation made for even those activities and programs which were initiated, as per recommendations, are curtailed during the implementation stage due to shift in priorities, to divert funds to other projects/schemes considered important by the government.

No single office or cell/unit was created to coordinate the implementation of the recommendations of the plans/review reports as a whole. Responsibility of carrying out the programs across large number of diverse areas was dispersed over many organizations without a central office to facilitate, monitor, compile and document the progress. The capacity of MoE and MINFAL is very low for such coordination and monitoring. The Biodiversity Secretariat and IG Forest's office is short of technical human resource and basic infrastructure.

The capacity in meteorological services of the country is weak and underdeveloped. Meteorological Department distributes reports to government organizations and media. This information does not reach the people in rural areas who are likely to be affected by drought. Early Warning Systems (EWS) should aim at picking up the forecast information by the government agencies and its dissemination to communities through NGOs/CBOs. With traditional systems of using indicators of seasonal forecast, the climate information through EWS can enable the farmers to increase production in high rainfall years and avoid losses in low rainfall years.

As a part of the vulnerability assessment a separate review of institutional capacity to predict and respond to drought and other environmental hazards is required. Other factors which need to be included in vulnerability assessment are: precipitation levels, trends and variability; ground and surface water availability; measure of water use; agricultural practices/land use/land tenure; population density and poverty levels; access to health facilities, relief centres, communication and transportation and institutional dimensions.

The present system of collection of reliable data and monitoring the drought is weak and needs improvement. The available information has limited dissemination and sharing between and across government departments and with organizations outside government system. Procedures, therefore, need to be developed to share and disseminate the available information in order to interpret it effectively for mitigating drought effects.

There is a leak of a coherent Land Information System due to lack of experienced human resource technologies and funds for land surveying.

There is general lack of awareness of environmental problems, drought and disaster management issues in the country. Communication at federal, provincial and district level needs to be improved to convey whatever information is available to others. The communities who are affected by drought are a valuable information source. Full use is rarely made of this valuable source.

A coordinated system of sharing of information may be developed and data to be interpreted more effectively for drought reduction. Strengthening of Meteorology Department for

improving the quality of early warning systems is required. Drought management and preparedness responsibilities are dispersed over a number of federal, provincial and district level administrative and relief agencies throughout the country. It is difficult to suggest or prescribe a unified plan of action to be adapted by all these agencies, in the event of the occurrence of drought. The task becomes more difficult given the fact that more research needs to be carried out to study the current coping mechanism, along with the vulnerability assessment and lessons learnt in managing the previous droughts.

There is a lack of coordinated and targeted research on land degradation. Very little research is being done to develop environmentally sound, economically viable and socially acceptable technologies required for irrigation, monitoring, water conservation and watershed management etc. there is a loss of traditional knowledge regarding adaptation to drought. Most of the institutions are implementing their projects in isolation resulting in duplication of work.

6.3.3 Capacity Gaps at Individual Level

Overall weak system in environmental management generally, and in sustainable land management particularly, are reflected in poor efficiencies and capacities of individuals in public sector organizations. This is further beefed up by the poor capacities of the institutions. Whole exercise of NCSA has clearly indicated general capacity deficit in the individuals. The root causes of this capacity deficit have been identified in above two sections dealing with UNCBD and UNFCCC and remain almost same for UNCCD. Lack of motivation due to low level of incentives/salaries, poor economical conditions, overall corruption in the society, political instability, rapid transfers away from hometowns, low level of training opportunities, poor infrastructure/field work facilities and lack of knowledge of sustainable land management, are some of the major issues identified at individual level.

7. Strategic Recommendations

7.1 Strategic Recommendations for UNCBD

7.1.1 Agriculture

7.1.1.1 General

i. Inter-sectoral Linkage and Policies - For development of policy, a very close Inter-sectoral linkage among relevant sectors including those related to agriculture, rural poverty alleviation, water resource management, industries, forests, livestock poultry and the environment should be developed;
ii. Use of remote sensing technology to compile updated land records for land-use planning, water resource management, and pest control;
iii. Establishing Foundation Seed Cells in each commodity research institute to produce sufficient quantity and quality of pre-basic seed to meet the requirement of public/private seed companies;
iv. Setting up seed banks of indigenous varieties at the provincial and district level to ensure good quality supply of seeds to farmers with proper incentives for use. The Federal Seed Certification and Registration Department needs to facilitate and strengthen the local seed producers in this activity;
v. In order to alleviate rural poverty, it is necessary to pursue alternative income generating opportunities for farmers. There is currently a dearth of post harvest facilities in rural locations, which contributes to great losses. The development of programmes to facilitate the establishment of facilities ranging from processing units, packaging plants, preservation techniques, and storage units, will create employment in the rural sector as well as boost agricultural productivity by providing necessary support services to farmers;
vi. The production of local organic fertilizers and outputs from organic farms could provide the rural community with alternative income earning opportunities. Providing farmers as well as the private sector with incentives in the form of subsidies, increased access to credit, technical training and equipment for the development of an organic farming industry (including farm produce and organic fertilizer development and use); and
vii. Disseminating organic farming principles on a wide scale, to decrease reliance on external inputs like chemical fertilizers and pesticides and to improve soil quality and its ability to retain water.

7.1.1.2 Crop Water Management

i. Promoting water-efficient crops and efficient cropping patterns, which maximize water retention and water use;
ii. Providing know-how/training and incentives like subsidies and access to credit for water conservation technology like drip and trickle irrigation systems, precision land leveling, sprinklers, rainwater harvesting, recycling, and wind breaks; and
iii. Promoting the use of Integrated Soil Management; making use of organic fertilizers and natural inputs to increase the quality and porosity of the soil, enabling it to retain more water.

7.1.1.3 Research and Development

i. Research on long-term effects of high-yielding crop varieties on biodiversity and landuse patterns should be initiated;
ii. Research and develop new crop varieties that are better suited to our local climatic conditions, considering water efficiency and land quality;
iii. Extensive research and development on land resource management, alternative energy sources, efficiency of irrigation water, fertilizer use, mechanization, horticulture, organic fertilizer, and postharvest technology and quality needs to be conducted;
iv. Research institutes should be facilitated and involved in the conservation of local indigenous varieties, which are being threatened by agricultural reliance on a limited number of crops;
v. Analysis of agricultural land records in relation to production, distribution of land, land-use patterns (with a specific focus on the constraints related to small farmers) are prerequisite to any new activities. Such analyses are an essential requirement and therefore methods must be developed to record these data;
vi. Establishing plant biogenetic resource conservation centers;
vii. Supporting systems such as the District Soil and Water Testing Laboratories, Pesticide Quality Testing Laboratories;
viii. Strengthening of local village organizations is necessary to encourage participation as well as coordination with research facilities and government policy-makers. This requires the provision of capacity building services to villages, where there are farmers' organizations and the development of new associations where they do not already exist. The focus of these programmes should be on the widespread use of sustainable farming techniques, particularly to tackle problems related to pest control, weed control, and water efficiency; and
ix. Provide technical training to farmers to adopt Integrated Pest Management (IPM) techniques, focusing on the use of bio-agents and natural predators to minimize the use of chemical pesticides;

7.1.2 Water

7.1.2.1 Water Resource Management

i. Analyze each project individually for its trade-offs. The problem in the past with large dams has been the lack of sufficient study on the social and environmental costs as well as the lack of effective silt drainage/removal facilities, which has led to the shortening of dam life. Therefore, a more calculated strategy, including intensive planning in the initial stages to account for the shortfalls of the past, is required;
ii. Construction of small dams with construction of water storage tanks with sufficient drainage facilities and installing water-lifting devices on streams in areas surrounding farms to provide irrigation water to barani agricultural land could also be explored. Furthermore, constructing underground dams in mountainous regions for rainwater harvesting, could also be another option;
iii. Ensuring better conservation and efficient management of water resources through the construction of carry-over reservoirs and the lining of water channels to minimize water losses;
iv. Rehabilitating the drains by removing sedimentation and repairing the gradient as well as reconstruction of breaches and other points of water loss;
v. Encouraging the use of renewable energy for groundwater extraction to increase water availability; and

vi. Promoting the use of recycling technology to increase water supplies. There is a need to establish wastewater treatment and filtration plants at feasible sites to facilitate recycling activities and decrease pollution.

7.1.2.2 National Drainage Programme

i. A review of the National Drainage Programme (NDP) is required to analyze the effectiveness of the present drainage structures, identify problem areas, and implement corrective action. There is a need for increased capacity building of the NDP to undertake these activities;
ii. It is necessary to implement the National Drainage Strategy to reduce effluent generation at source and dispose of it in an environmentally sound manner; and
iii. Increased involvement of the private sector in drainage programmes, including involvement in reclaiming agricultural land and investing in facilities should be taken into consideration.

7.1.2.3 Institutional Strengthening

i. There is a need for increased cooperation among different institutions in agricultural, fishery, wetland, forestry, and urban areas, to ensure collaboration and joint solutions to problems;
ii. The capacity of the Water & Sanitation Departments must be enhanced to ensure that they are equipped to effectively develop, monitor, and enforce policies and legislation;
iii. In addition, the possibility of separating water and sanitation departments and making them individual entities should be explored; and
iv. Studying the impact of release of polluted water from cities and towns to rivers and canals in Sindh and outlining possible solutions.

7.1.2.4 Research and Development

Investment in research in the water sector is crucial to the development and implementation of a coherent water policy. This research will help provide policy-makers with a reliable database on water use, distribution, water losses, efficient pricing policies, the feasibility of introducing water taxation policies, defining users and their needs, viable conservation models, land tenure systems, water rights, sector-wise water requirements, and efficient cropping patterns. In order to have effective and reliable research, it is necessary to increase the capacity of relevant institutions to conduct action-based research that can translate into programmes and projects in the water sector.

7.1.2.5 User Group Participation

i. There is a need to increase the participation of water users in the design, development, operation/maintenance, and financing of water supply systems;
ii. A comprehensive system of On-Farm Water Management needs to be introduced to reduce conveyance and field losses through the improvement of watercourses, precision land-leveling, organizing water user associations, and establishment of demonstration plots.

7.1.2.6 Media Awareness

It is important to disseminate a culture of conservation within the entire community via mass awareness campaigns conducted through the media, educational institutions, the private and public sectors as well as through organizations working at the grassroots level in rural areas. Radio in particular is an extremely powerful tool for such an issue, considering its vast network and popularity in the rural areas. Special programmes that focus on issues of water management can be produced in regional languages for the benefit of farmers and the rural populace.

7.1.2.7 Supporting Policies and Legislation

The development of supportive policies with special reference to water distribution issues as well as efficient use is a necessity. This should promote an integrated crop management system, integrated soil management as well as a crop zoning system and analysis of optimal crop patterns. It should also establish community seed banks with linkages to local farmer cooperatives and promote water efficient crop varieties. In addition, there is a need to implement legislation to address the issue of water quality.

7.1.3 Coastal and Marine Ecosystem

7.1.3.1 Inter-agency Coordination

i. Capacity building activities is provided for the relevant agencies related to the coastal and marine sector including the Coastal Development Authority, the Ministry of Environment, the Karachi Port Trust, Port Qasim Authority, the Coast Guard, and the Karachi and Korangi Fish Harbour Authorities. It is also necessary for these agencies to maintain close contact with each other for complementary and mutually supportive action;
ii. Establishing Marine Protected Areas (MPAs), after intensive study, to promote the rehabilitation of key areas that have been affected by degradation. These areas will then serve as breeding and nursing grounds to support and increase the productivity of the fishing industry; and
iii. Re-evaluating the maximum sustainable yield figures to discourage overfishing.

7.1.3.2 Research and Development

i. Capacity building of organizations like National Institute of Oceanography (NIO), SUPARCO, Maritime Security Agency (MSA), and academic institutions needs to be done to pursue current and reliable research on costal environmental issues;
ii. Research institutions and government departments should also collaborate to gather relevant data on marine resources, fish stocks, biodiversity, the impact of pollution, the impact of development activities, and the importance of mangroves; and
iii. Undertaking research on the potential of coastal agriculture using salt-tolerant crops as well as impact studies for new initiatives.

7.1.3.3 Legislation and Policy

i. Legislation needs to be made to protect coastal and marine resources from degradation through overexploitation of resources, pollution, and release of inadequate water from upstream users;
ii. Coastal wetlands are covered under the RAMSAR Convention.Over 260,000 ha of mangrove forests were declared protected forests in 1958 and the wildlife of the Indus

Delta is protected under the Sindh Wildlife Ordinance, 1972. However, these regulations are rarely enforced leading to overexploitation, which is not monitored or controlled;

iii. Implementing the Pollution Control Act and the NEQS to minimize pollution in the coastal and marine areas and to ensure implementation of the Water Accord that requires sufficient freshwater release to coastal areas;

iv. Developing legislation to curb the discharge of untreated solid and industrial waste as well as agricultural effluents without treatment into coastal waters; and

v. Encouraging public/private partnerships to clean up harbours and enforce laws relating to coastal development.

7.1.3.4 Infrastructure Development

i. Constructing wastewater treatment plants and strengthening the capacity of EPA to effectively enforce the existing environmental laws and NEQS;

ii. Establishing adequate infrastructure facilities for remote coastal fishing villages in coastal districts including road development, fish harbour facilities, and provision of water supplies; and

iii. Rehabilitating Karachi harbour to deal with siltation problems.

7.1.4 Wetlands

7.1.4.1 Institutional Strengthening

i. Effective management plans that integrate indigenous knowledge with the principles of wetland conservation are essential for the protection of important sites;

ii. Capacity building of the organizations responsible for wetlands is required;

iii. Increased coordination among governing agencies as well as NGOs such as WWF working in the field of wetland management;

iv. Collaboration with the agricultural sector to minimize the use of harmful chemicals and fertilizers that harm wetland fauna and flora;

v. Organizations active in the field of wetland conservation like WWF Pakistan and IUCN Pakistan should be encouraged to impart training to relevant government bodies to increase knowledge and technical expertise on the effective management of wetland sites;

vi. For the implementation of management plans an effective monitoring mechanism with a feedback system should be introduced;

vii. The provincial and district governments need to work in coordination with each other on the issues of wetland management. The P&DD should play the role of facilitator in the implementation of integrated management plans as well as on cross-cutting issues proposed by various line departments;

viii. Studying the damage caused by the disposal of untreated effluent on wetlands, pollution of river and their effect on wetlands dependent on freshwater flows from the river;

ix. Conducting comprehensive EIAs before initiating any land reclamation projects on coastal wetlands. Research in this field should be action-based and conducted by relevant institutions with sufficient backward and forward linkages to ensure that their work is being translated on the ground;

x. Ensuring that the P&DD has a block allocation in its ADP for outsourcing of research/feasibility studies on important issues related to wetland conservation.

Increasing research on the effects of invasive/exotic species in wetland habitats as they have had a negative effect on the biodiversity of wetland species in the past;

xi. Conducting baseline studies on the importance of wetland biodiversity, including agrobiodiversity, insects, microorganisms and their role in supporting other life within wetland ecosystems; and

xii. Conducting investigative studies on more sites that could be eligible for listing under the RAMSAR Convention.

7.1.4.2 Legislation and Policy

i. Establishing a provincial level Wetland Management Committee to oversee all activities related to wetlands in Pakistan;

ii. Enforcing laws and standards (such as NEQS) on pollution-generating industries that release untreated effluent into water channels. They should be fined for noncompliance;

iii. Reviewing and updating wetland and hunting legislation and ensuring its implementation in wetland sites;

iv. Enforcing legislation to ensure comprehensive EIAs for all development projects near wetland sites and their potential affect on biodiversity; and

v. Incorporating indigenous knowledge into policies to make them more suited to the local environment.

7.1.4.3 Conservation and Public Awareness Raising

i. There is a need for increased awareness raising activities among the community, policy-makers, and other sectoral stakeholders like the agricultural and industrial sectors on the importance of conserving the biodiversity of wetlands;

ii. The use of media and NGOs to spread awareness on the various species dependent on wetlands should be encouraged and the necessity for widespread and integrated wetland conservation activities at the grassroots level should be promoted; and

iii. Another aspect should be to promote awareness and institutionalize conservation-friendly wetland management practices while seeking to enhance conservation incentives for poor households who depend on wetland resources.

7.1.5 Rangeland

7.1.5.1 General

i. There is a dire need to undertake R&D to improve livestock handling and management practices through integrated management of rangelands;

ii. It is also important to disseminate relevant information regarding range improvement and management technology among grazing communities, through extension workers;

iii. Research and development should also be undertaken for new plant varieties that can be planted and which are suitable to the climate and carrying capacity of a particular rangeland. This means selecting multipurpose trees and shrubs that are suitable to the rangeland climate and can be used to provide both fodder and fuelwood;

iv. Equitable water resource management is required to ensure the proper distribution of grazing animals in different parts of the range area that at the moment remain unutilized due to lack of drinking water. Therefore development of water points is essential as in overgrazed areas they can lead to further deterioration of the range;

v. Small dams, channels, and streams to collect and store water may be constructed after careful feasibility studies. The reserve of water in these small dams can serve both the animals and human beings in the area;
vi. In the Kohistan region, particularly where many runoff torrents (Nain) flow heavily during and after rainfall for some time, delayed action dams can be constructed to store the water for cultivation and livestock purposes;
vii. In most rangelands, the dependable and common source of water for livestock is wells. The number of wells may be increased in appropriate areas after a detailed survey and examination of the quantity and quality of water;
viii. Assessing traditional methods of water collection in rangelands and integrating these with appropriate new technology, which should then be disseminated to the communities;
ix. Reseeding of grass, particularly in those ranges where the desirable species of grass are lost either due to overgrazing or soil erosion; and
x. Exploring water-spreading techniques as they help to control soil erosion and movement of sediment, and also conserve water for increased forage production.

7.1.5.2 Institutional Collaboration

i. Institutes responsible for rangeland rehabilitation and development need to be brought together on a single platform in order to increase collaboration among them and to address the issues at hand. More importantly, the work on rangelands needs to be brought under the purview of districts and as such district governments need to be strengthened to carry it forward; and
ii. Rangeland management is equally a part of forestry conservation and livestock development. Therefore, it is critical that these respective agencies work in tandem with each other and policies are framed that reflect their overlapping interests.

7.1.5.3 Technical Innovations

i. Transfer of technology regarding livestock breeding and exploring the genetic potential needs to take place; and
ii. Furthermore, installation of windmills may be explored in the range area to lift water from open surface wells.

7.1.6 Biodiversity

7.1.6.1 Institutional Strengthening

i. Wildlife, forestry, fisheries, and agricultural departments, working in various areas related to biodiversity need to be strengthened through capacity building and training of staff ;
ii. Develop and institutionalize systems to monitor the components of biodiversity and implementation of conservation activities;
iii. It is also important that these institutions have a strong link to policy-making organizations; and
iv. There is a need to build the capacity of the department to ensure the implementation of management plans, particularly for Protected Areas.

7.1.6.2 Research and Development

i. Undertaking surveys and publishing literature on the current status of biodiversity in the province to ensure effective conservation policies;
ii. Census of game birds and animals after the breeding season should be carried out;
iii. Based on such a census, the number of birds/animals to be hunted on each permit and the span of the hunting season can be determined. This should be followed by collecting information on flora and fauna species and conducting a population census and studies on the current threats facing them;
iv. There is also a need to conduct research on threats being faced by various ecosystems, the benefits of biodiversity, and how this relates directly to species variation in the wildlife sector;
v. Widespread dissemination of such data is necessary among the community and wildlife professionals, as well as policy-makers to ensure commitment to the sustainable use of biodiversity;
vi. Preparing authentic and reliable inventories of endangered and threatened species so that effective steps may be taken for their preservation;
vii. Studying the effects of climate change, the use of agricultural pesticides/insecticides on the surrounding environment, and the impact of invasive species; and
viii. Developing new technologies and innovations with regard to natural resources currently being used by local communities (such as medicinal plants) to allow them to export value-added products rather than simply raw materials from this sector.

7.16.3 Policy and Legislation

i. There is inertia in implementing legislation like the Forest Act and the Wildlife Protection Act that safeguard biodiversity resources. Much of the legislation related to biodiversity is more focused on wildlife preservation rather than on flora conservation and thus it has to be amended to incorporate the needs of this sector;
ii. Ensuring compliance to the CBD by developing an effective framework for its implementation and building the capacity of agencies to comply with it;
iii. Designating protected areas on the basis of diversity, value of resources, and level of habitat destruction;
iv. Ensuring compliance with recommendations outlined in the BAP and re-activating the BAP Committee to oversee its implementation;
v. Amending NEQS to cover specific areas where biodiversity resources and ecosystems are under threat, i.e. in agricultural lands where pesticides and herbicides are regularly used;
vi. Institutionalizing and strengthening impact assessment (EIA and SEA) procedures for projects, programmes and policies; and
vii. Developing policies to regulate access to and use of genetic resources.

7.1.6.4 Conservation Efforts

i. Both in-situ and ex-situ conservation efforts need to be undertaken as outlined in the CBD and emphasized in the BAP. In-situ conservation is recognized as the primary approach to biodiversity conservation and is particularly concerned with protected areas and the environment surrounding them;
ii. It is essential that the protected area system is strengthened, protected area management is made more effective, and local communities are involved in it;
iii. This can be done by undertaking a review to identify gaps, implementing legislation, and providing for collaborative management systems involving government, NGOs, and local communities;
iv. The protected area system also needs to be expanded to ensure that all terrestrial, freshwater, coastal, and marine zones are represented;
v. Critically threatened ecosystems should be immediately surveyed and identified and plans made for their conservation;
vi. Of critical importance is the revision/development of effective protected area management plans for various sites;
vii. Ex-situ conservation is also necessary to support in-situ conservation;
viii. This can be very useful in conserving threatened and domesticated species, medicinal plants, other plant and tree species, and micro-organisms through seed banks, gene banks, in vitro storage, and captive breeding;
ix. Captive breeding is especially useful to restore endangered species back into the wild. This type of conservation also provides researchers with opportunities to study all kinds of biodiversity in controlled conditions;
x. Updating the system of protected area categories and redefining boundaries if necessary; based on species-area and species-perimeter considerations;
xi. Encouraging the establishment of private and community-protected areas;
xii. Building the capacity of protected area authorities through the provision of funding, equipment, staff, and training; and
xiii. Compiling a compendium of current ex-situ activities such as herbaria, livestock breeding farms, seed banks, genome banks, plant breeding centers, and captive breeding farms.

7.1.6.5 Community Awareness and Involvement

i. Innovative conservation programmes and projects need to be undertaken by government departments with the active involvement of local communities. This would also provide jobs and result in economic uplift of the surrounding areas in addition to conservation;
ii. Salaries for community members directly involved in conservation projects can be raised from the proceeds of permitted hunting and from financial assistance received by wildlife trusts;

iii. The establishment of private game farms should also be encouraged to decrease pressure on government reserves. Such activities have yielded positive results in other parts of the country;
iv. Develop educational and awareness-raising material for different target groups on wildlife issues through popular media and include biodiversity-related information in school syllabuses;
v. Many NGOs and CBOs, operating at the local level, are involved in natural resource management. It is important to involve such organizations and to strengthen them to undertake projects related to conservation of biodiversity with increased community involvement;
vi. Providing incentives to farmers to cultivate small wood lots or grove plantations for roosting species and persuading land developers to leave scattered brush and scrub jungle where birds can breed easily and escape from predators;
vii. Establishing crocodile, freshwater turtle, frog, toad, reptile, and amphibian hatcheries with increased community involvement and public/private partnerships in this field; and
viii. Encouraging trophy hunting with proceeds being shared between local people and wildlife protection staff.

7.1.7 Fisheries

7.1.7.1 Policy and Administrative Management

i. Increased coordination and collaboration is necessary among these different players responsible for activities related to marine fisheries and coastal management to ensure mutually supportive policies related to the growth of this sector;
ii. Giving authority to one agency over the mangrove ecosystem along the coastline as these areas, which host valuable species, provide necessary support for the marine fishing industry;
iii. Evaluation of the impact of diminishing freshwater on the conditions of the coastal mangrove forests and the socioeconomic implications for coastal and deep sea fisheries. This is necessary to establish the minimum amount of water flow required for the Indus Delta;
iv. Enforcing integrated coastal zone management approaches, strategies, and actions for all development in coastal areas. This would also require improved and effective coordination between all government agencies with authority over coastal areas. There is an immediate need to provide the small fishermen with modern gear and facilities for proper storage of their harvest as well as training them on the usage;
v. With the assistance of commercial banks and financial institutions provisions for development loans for inputs for increasing the production of small farmers be arranged. At the same time there should be provision of small development loans with low interest rates to fishermen and fish farmers; and
vi. Developing shrimp and finfish aquaculture facilities through the re-activation of shrimp and finfish hatcheries of the Marine Fisheries Department (MFD) and the National Institute of Oceanography (NIO).

7.1.7.2 Research and Development

i. Institutes that have the required facilities to undertake these R&D activities should have increased in coordination and collaboration with local indigenous groups and with policymaking organizations to make the research more effective at grassroots and policy levels;
ii. Economic valuation of marine resources should also be undertaken and fishing quotas must be assessed to ensure sustainability;
iii. There is a dire need for research to be carried out on brackish water and drains fisheries that can provide invaluable information on the breeding bed for shrimps and other valuable species;
iv. Raising awareness through widespread information dissemination on sustainable and efficient fishing practices, the disadvantages of using harmful nets, and the importance of use of Turtle Excluder Device (TED; and
v. Undertaking research and preparing updated data banks of the physical, climatic, hydrologic, and ecological features and processes of our coastal areas.

7.1.7.3 Laws and Legislation

i. Enforcing the Exclusive Fishery Zone (Regulation of Fishing) Rules (1990) and the Territorial Waters and Maritime Zones Act (1976), to prevent pollution in the deep sea;
ii. Enforcing the Sindh Fisheries Ordinance (1980) after necessary amendments to cover agricultural effluents;
iii. Re-activating the Marine Pollution Control Board with responsibility for pollution mitigation, especially during emergencies such as oil spill disasters;
iv. Drafting legislation to require gradation of fishing boats/trawlers and reduction in the number of boats operating within a 12 nautical mile zone;
v. Enforcing laws relating to overfishing in territorial waters. This should include the imposition of severe penalties on foreign fishing vessels as well as enforcing the seasonal ban on fishing, which must be applied to all commercial fishing craft without any concessions or exceptions;
vi. Exploring possibilities of Individual Tradable Quotas, which would entitle the holder to a catch of specified weight and type of fish; and
vii. Establishing Marine Protected Areas (MPAs) with authority and supervision of these areas delegated to a relevant and capable government agency. MPAs in other countries have been very beneficial in rehabilitating overexploited areas as well as increasing the productivity of adjoining areas by providing necessary and safe breeding and rearing grounds for fisheries.

7.1.7.4 Inland Fisheries

i. Promulgating laws to declare certain fresh/brackish water fish-breeding areas as protected areas to safeguard fish habitats; and
ii. Enacting legislation to require gradation of fishing boats.

7.1.7.5 Community Participation

i. Participation of local communities in the conservation and sustainable use of inland fishing resources is crucial; and
ii. Capacity building of the community is also necessary in terms of raising awareness on sustainable fishing practices, establishment of credit facilities, the use of proper fishing gear, technical training on skills' enhancement, and access to advanced technology for fish farms.

7.1.8 Livestock

7.1.8.1 General

i. Establishing more and better equipped animal hospitals and mobile veterinary health units for effective treatment of animal disease with a capacity to produce vaccines for viral diseases; and
ii. Strengthening of extension services to the livestock sector; the government must support the private sector and NGOs in this regard to set up projects to improve existing and develop new extension services on a priority basis in Sindh.

7.1.8.2 Research and Development

i. Identifying the characteristics of different livestock systems and understanding the characteristics of different subsystems of livestock production such as dairy production, meat production, and draught animals;
ii. Undertaking research on poultry and livestock diseases, prevention and cure as well as technology transfer to farmers;
iii. Undertaking research and exploring the potential of artificial insemination; and
iv. Transferring research results to the farmers via appropriate technology transfer methods and an effective extension system.

7.1.8.3 Technological Innovations

i. Introducing high pedigree/fertile bulls and artificial breeding programmes at the village level;
ii. Improvement in feeding practices through propagation of multi-cutter fodder, straw enrichment techniques and mini feed mills at the district level; and
iii. Increasing the coverage of artificial insemination through provision of equipment, training of inseminators, and improving the supply of semen.

7.1.9 Protected Areas (PA)

7.1.9.1 Strengthening Existing PAs

i. Developing a comprehensive plan of action to strengthen existing PAs system;
ii. Ensuring involvement of local communities and other stakeholders for collaborative management of the protected areas;

iii. Enhancing the capacity of communities living in or adjacent to PAs to participate in management of these areas through appropriate training and education, and through recognizing local expertise and traditional institutions;
iv. Re-defining protected areas boundaries based on species range and corridors requirement to optimize viability and connectivity;
v. Examining the status of all the game reserves in NA and re-classifying these under category VI of IUCN, the sustainable use areas;
vi. Exploring possibility for establishing a trans-boundary "peace park" with the bordering countries; and
vii. Building Capacity of Northern Areas Forest Department in PAs management through staff training, sufficient funding, and provision of necessary equipment;.

7.1.9.2 Creating New PAs

i. Making amendments in the existing legislation for including new categories of PAs;
ii. Expanding PAs system to ensure protection to all nationally and internationally threatened species of flora and fauna;
iii. Establishing new protected areas under PAs' categories V and VI to provide corridors and connectivity to the existed protected areas; and
iv. Creating new PAs in broad consultation with all the stakeholders, in particular with local communities.

7.2 Strategic Recommendations for UNFCCC

7.2.1 Research and Variability

Although a broad understanding of climate processes does exist today, but in order to make future projections of climate and sea level change based upon emission scenarios, and to study the impacts of climate change there is a dire need to get a complete picture of warming world and other changes in the climate system.

7.2.1.1 Systematic Observations, Modeling and Process studies

i. Capacity building for understanding of the climate processes through appropriate trainings in organizations managing and using natural resources;
ii. Reduction in uncertainties through improvement in detection techniques, data processing techniques, analytical methods, spatial sampling, observational networks, data coverage to include current climate and palaeoclimates, quality control of data, inter-comparisons, modeling and on attribution and quantification;
iii. Explore international assistance through bilateral, regional technical cooperation for latest technology & equipment and support to carry out research in basic science on climate;
iv. Strengthen national and international co-operation and co-ordination whilst undertaking collaborative efforts and building linkages in order to optimize utilization of scientific, computational and observational resources; and
v. Strengthen institutions like, Global Climate Impact Study Center, Pakistan Meteorological Department, National Institute of Oceanography and universities to

promote advanced R&D, undertake data management, postgraduate teaching programmes and be active in sensitizing the public, decision and policy makers.

7.2.1.2 Projections of Future Scenarios at Regional Level.

i. Capacity building through training in Climate Change Science, trend analysis, forecasting, modeling, scenario building, GHG inventory and use of climate models with the appropriate spatial details;
ii. Develop relevant climate change indicators and make projections of future climate (including forecasting climate hazards and climate extremes) and sea level rise;
iii. Establish permanent mechanism for GHG inventory and regular Energy Audit;
iv. Seek international support and participation in global data collection efforts; and
v. Capacity building of National Disaster Management Authority and development of Disaster Evacuation plan with accompanying response strategies including public outreach programmes such as appraisal of hazard level, evacuation plans, amongst others.

7.2.1.3 Data Management and Information System

i. Develop a strategy for coordinated collection of relevant data needed for projections and mitigation analyses;
ii. Seek foreign technical assistance and funding for the upgrading of existing system;
iii. Establish protocol for data sharing; free exchange of data, information and research findings; and
iv. Clearing House Mechanism should be strengthened and used for implementation of the recommendations which this report is presenting in the domain of information exchange as one of the areas with a capacity deficit.

7.2.1.4 Research and Development on Climate Change

i. Develop a robust national research programme to undertake R&D on CC impacts, adopting an integrated approach and compliant with our commitments under various conventions, to develop climate change indicators, and to make projections of future climate changes and sea level rise with appropriate mitigation analyses;
ii. Capacity Development of relevant organizations mentioned in Action Plan by deployment of latest technologies trend analysis, forecasting, modeling and scenario building, in the identification of vulnerable areas and sustainable training programme for human resource development;
iii. Develop National Climate Change Policy, review existing environmental policies, reinforce regulations and strengthen enforcement of environmental laws;
iv. Introduce new technologies and advanced instrumentation methods in Meteorology/Energy/Transport to include automated systems, and latest gadgets; and
v. Advanced Signal and Data Processing – advanced analytical techniques in signal analysis including spatial sampling, measurement uncertainties, quality control, analysis of extremes events, etc.

7.2.2 Response and Mitigation: Energy Sector

7.2.2.1 Promotion of Low GHG Emission/ Renewable Energy Technologies

i. Promotion of the use of renewable energy like wind, hydro, solar, biogas, ocean, tidal, ethanol and gas hydrates in an effort to reduce GHG emissions and to sustain utilization of local energy resources;
ii. EEZ of Pakistan has a huge potential for methane hydrate crystal mining. These rich deposits of frozen natural gas crystals reserve on the ocean bottom would be a notable leap in our ability to provide energy for the future. Efforts should be made to acquire new technologies to exploit such energy resources;
iii. Promote clean fuel and power technologies; and
iv. Develop programmes with national and international technical and financial support for Research, Development and Demonstration (RD&D) on low-emission / renewable energy technologies.

7.2.2.2 Promotion of Efficiency Use of Energy

i. Development of programme for a comprehensive energy audits or assessments and reviews in the public, private and economic sectors to improve productivity, energy efficiency, reduce waste and save energy;
ii. Increase sensitization and promote use of energy efficient products and technologies and best management practices whilst sustaining quality, reliability and performance characteristics;
iii. Encourage and vigorously pursue a culture of energy management to improve energy efficiency;
iv. Develop efficiency standards for household appliances;
v. Promote use of new and innovative designs (e.g. eco-school, eco-house, eco-farm, eco-village) appropriate to local climate in the construction sector to bring down energy costs;
vi. Update building codes; adopt, maintain and extend Model Energy Code; develop software program to ensure Model Energy Code compliance; establish performance indices, guidelines and regulations to optimize energy use in new and in old buildings;
vii. Capacity building through advanced training for technical know-how; and
viii. Provide market-based incentives and tax credits; Remove market barriers to penetration of cleaner, more efficient energy supply further to study on the economic costs and implication of the policy.

7.2.3 Response and Mitigation: Transport

7.2.3.1 Promotion of Low-Emission Alternative Transport Technologies

i. Review and refine existing policies and introduce new policies to adopt lower emission transport technologies by considering limiting engine capacities of road vehicles, removing barriers to encourage import of fuel efficient vehicles;
ii. Capacity enhancement of transport departments through advanced training to assess the effectiveness and appropriateness of the alternate transport technologies;
iii. Develop and publicize incentive mechanisms to encourage entrepreneurs (local and foreign) to invest in potential for alternate fuel vehicles and technologies; and
iv. Undertake R&D and encourage use of technology and fuel that would reduce consumption of petroleum--based fuel and reduce carbon emissions associated with cars, light trucks and heavy vehicles: on Bio-fuels (such as bio-ethanol and bio-diesel), encourage its use with the aim to promote the large-scale use of environmentally sound, cost competitive, biomass-based transportation fuels and to provide biomass for energy production.

7.2.3.2 Introduce Traffic Management Plans

i. Develop a Data Management and Information System (DMIS) for the transport sector. Along the same line, improve collection strategy for useful data needed for land/ air/marine transport demand / emission projections and for mitigation analyses;
ii. Develop a smart road network – Enhance land use planning to explore new road networks to reduce congestions and the need for transportation and Upgrade road networks through models and scenarios for traffic flow, replacing busy roundabouts/intersections by flyovers, conversion of 2-way lanes into one way, restricted access to major roads and highways, provision of special lanes for non-motorised mode of transportation; and
iii. Introduce Mass Transit System in big cities.

7.2.3.3 Research and Development

i. Develop models and scenarios for passenger forecasting - detailed analysis of the different drivers of demand in each market segment, with explicit consideration of uncertainties;
ii. Develop models and scenarios for traffic flow for better traffic management;
iii. Enhanced carbon technologies: carbon sequestration under changing land use practices; carbon sequestration from fossil fuel combustion; road surface carbon sequestration by the bitumen dressing on road surfaces; and
iv. Impact on performance on air/sea/land operations due to climate hazards.

7.2.4 Vulnerability and Adaptation

7.2.4.1 Glaciers and Glacial Lakes

i. Adoptions of new technologies using GIS and remote sensing technologies for monitoring of Glaciers and GLOF;
ii. Promotion should be done of alternative fuels among communities living around glaciers; and
iii. Forestation should be done around glaciers and vegetation cover planted along streams.

7.2.4.2 Water Resources and Irrigation System

i. Water management practices need to be made more efficient, through lining of water channels, where appropriate, and upgrading of the irrigation system to minimize wastage of water. This should be supplemented with the construction of small reservoirs and check dams to provide adequate supplies of water to rural areas and appropriate water pricing policies mandatory to encourage water conservation;
ii. Providing know-how/training and incentives like subsidies and access to credit for water conservation technology like drip and trickle irrigation systems, precision land leveling, sprinklers, rainwater harvesting, recycling, and wind breaks;
iii. Promoting the use of Integrated Soil Management; making use of organic fertilizers and natural inputs to increase the quality and porosity of the soil, enabling it to retain more water;
iv. Review of policy for sustainable management of ground water including coastal aquifers;
v. Bridging knowledge gap with respect to ground water model in line with sea level rise scenarios.
vi. Application of Climate Early Warning in Water resources management;
vii. Systematic monitoring of quantity and quality of surface and groundwater resources and effluent;
viii. Policy development and promotion of re-use of treated waste water; and
ix. Optimize use of river off-takes.

7.2.4.3 Agriculture

i. Altering cropping patterns in line with shifting weather patterns and adopting climate suitable farming practices;
ii. Introduction of drought and heat resistant crop varieties and reducing dependency on traditional agricultural staples;
iii. Enhancing the national food storage capacity and increasing shelf life of perishable items through better processing and preservation;
iv. Introduction of alternative feed sources for livestock;
v. Exploration of genetic solutions for increasing the climate resilience of livestock and improving breeds;

vi. Extending subsidies, micro-credit and insurance facilities to farmers for cushioning against agricultural climatic events and for diversifying livelihood options for at-risk communities;
vii. Formation of an integrated agricultural research and information system that directs data to farmers and provides them solutions;
viii. Extending special government funding to increase forest cover;
ix. Application of Early Warning System at field level for efficient water use
x. Improvement in Crop management and Pest control techniques;
xi. Research to Identify adaptive crops tolerant to salinity;
xii. Develop suitable salinity management practices such as efficient drainage, use of acidifying and organic fertilizer; and
xiii. Building the capacity of farmers on climate suitable technologies and farming practices.

7.2.4.4 Livestock and Fisheries

i. Conduct research on new varieties of fodder crops suitable under water stress and high temperature condition;
ii. Upgradation of veterinary research in the country with trained human resource and equipment; and
iii. Research on Climate Change Impacts on Fish Production.

7.2.4.5 Forestry and Land Use

i. Simulation modelling of different scenarios for the assessment of changes in the forest area, productivity, insect life cycle, spread of forest pests etc. and possible shift in the location of biomes under the changing climate; and
ii. Socio - economic implications of climate change on forest ecosystem and livelihood of local communities.

7.2.4.6 Coastal zones

i. Integration of Climate Change and related issues in Coastal Area Development Plan;
ii. Development and mapping of vulnerable areas of coastal zone (vulnerability atlas) on the basis of Climate Change scenarios;
iii. Development of joint research programme on impacts of global warming on marine resources of Pakistan;
iv. Develop sustainable programme for mapping the marine habitat and resource for coastal areas of Sindh and Balochistan in Pakistan;
v. Monitoring of beach profile and further research on hydrodynamics of beach; and
vi. Robust rehabilitation programme for mangrove forest in costal areas of Pakistan.

7.2.4.7 Biodiversity

i. Under take research on Climate Change impacts on species with reference to their possible extinction;

ii. Under take research on effect of warming of water bodies on biological processes and aquatic life; and
iii. Conduct studies on effects on migratory birds due to change in habitats, water, salinity, inundations.

7.2.4.8 Health

i. Development of a long term monitoring programme to assess the impact of Climate Change and variability on human health and well being;
ii. Further studies on the impact of Climate Change on the spread of vector borne diseases like malaria, cholera and bird flue etc;
iii. Proper drainage system to evacuate stagnant water;
iv. Research on the understanding of physiological responses of human beings to risen temperature; and
v. Develop research programme with international cooperation, the region specific health scenario studies.

7.2.4.9 Extreme Events

i. Harnessing hill torrents, improvements in flood forecasting and warning systems as well as the construction of embankments, spurs, and hill torrent structures for the protection of infrastructure in the event of a natural disaster in mountainous regions;
ii. Enhanced disasters preparedness of related agencies and communities at risk by establishing early warning systems;
iii. Bring in technologies for protecting coastal boundaries from flooding;
iv. Studies on global climate system and possible sea level rise with identification of adaptive measure and response strategies;
v. Monitoring Hydrodynamics of coastal areas and beach profiles;
vi. Enforcement of stringent laws on setback distance and construction guidelines in coastal areas; and
vii. Capacity building of Meteorological Department for Early Warning and Forecasting of drought rain and floods.

7.3 Strategic Recommendations for UNCCD

7.3.1 Agriculture

i. Development of methods to control waterlogging and salinity through preventive and curative measures, including promotion of gypsum for amelioration of sodic soils;
ii. Research methods to promote desert agriculture, including options for the development of biosaline agriculture;
iii. Promoting water-efficient crops and efficient cropping patterns, which maximize water retention and water use;
iv. GIS based Monitoring of land use for mapping of cultivated land lost annually to urban and industrial uses;

v. Develop National Land Use Policy and implementation mechanism with allocation of financial resources; and
vi. Many ongoing activities in the agricultural sector are not linked to desertification/land degradation and/or SLM. The mainstream agricultural sector needs to be included in SLM activities to address desertification nation-wide.

7.3.2 Water

i. Development of a continuous monitoring of ground water level;
ii. Introduction of precision leveling system for improvement of watercourses to minimize water loss, as well as of agricultural land to enhance its ability to retain water;
iii. Overcoming water shortages in the arid zones through the construction of small dams at feasible sites. This would also include the excavation of the canals in the vicinity for better distribution of summer surplus water to desert areas;
iv. Providing know-how/training and incentives like subsidies and access to credit for water conservation technology like drip and trickle irrigation systems, precision land leveling, sprinklers, rainwater harvesting, recycling, and wind breaks;
v. Comprehensive Water Policy: In order to curb the growing level of conflict among provinces on issues of water distribution, and to counter the scarcity and misuse of water resources, the government needs to formulate a comprehensive water policy that can support conservation as well as current demands. This policy needs to encompass all aspects of the water sector and address issues in distribution, irrigation, water conservation projects, food security, new infrastructure requirements, needs of different water users (including different socioeconomic groups), and women's roles.

7.3.3 Institutional Strengthening and Capacity Building

i. Institutional strengthening of concerning bodies is imperative in order for them to pursue strategic policies, which are in line with conservation and sustainable development principles;
ii. Capacity building of Ministry of Environment, EPA, EIA/IEE consulting firms and relevant line departments on desertification and issues associated there with;
iii. Project interventions under UNCCD have been largely based on pilot approaches. Broader scale mainstreaming of combating of desertification/land degradation and/or sustainable land management (SLM) needs to be implemented;
iv. Little work seems to have been carried out with regards to Article 18 on Transfer of Technology. Technology transfer and improvement of traditional/locally developed technologies can be potentially useful interventions; and
v. Focus on local and regional level implementation needed. Strengthen natural resource users through increased individual, institutional, and systemic capacities.

7.3.4 Research & Development

i. Develop international coordination for research on desert farming and arid zone forest resources. Many other arid zone countries have pursued successful development projects in this field and there is much to learn and adopt from their experiences; and
ii. Research projects needs to be prepared that in a synergetic sense could contribute utmost to capacity building and constraints removal for implementation of UNCCD.

These projects need to have an integral character and rely on the principles of sustainability. In this sense, development of the environmental impact assessment studies is of particular importance, as will be necessary to develop qualitative and quantitative determination of the natural resources of the country as well to elaborate integral programmes for use of natural resources, which, as sectoral analysis of present state has shown, are used in a way that brings great damage to the environment as well as to the country's economy.

7.3.5 Forests

7.3.5.1 Institutional Strengthening and Inter-sectoral Linkages

i. The capacity of institutions responsible for the forest sector needs to be enhanced to ensure that viable conservation and sustainable development policies are pursued. This would require the development of strong linkages between institutions as well as mutually supportive policies and learning between the different departments and agencies involved in the forestry sector including the Forest Department, Revenue Department, National Highway Authority, and other provincial level institutions;
ii. Institutional strengthening of these bodies is imperative in order for them to pursue strategic policies, which are in line with conservation and sustainable development principles; and
iii. There is a need for overall reform of the Forest Department to ensure that capacity is enhanced and that incentives are introduced, which instill greater motivation to pursue policies. Currently, salaries are very low, which forces junior staff to ignore their responsibilities and sometimes even to degrade forest resources to supplement their meager income.

7.3.5.2 Research and Development

i. As no quality research is being undertaken in this field, there is considerable data deficiency in the forestry sector. It is important that forest policies create the incentives for greater investment in research to assess forest assets including tree species, biodiversity value, economic value, and other areas of research priority;
ii. Action-based research should also be encouraged at the policy level to ensure that the results of research will be translated on the ground;
iii. In order to ensure a sustainable approach in the use of forest resources, it is necessary to pursue economic valuation of the entire ecosystem encompassing forest resources including species, biodiversity, and timber value. This will ensure that the economic policies pursued will not curtail development efforts.
iv. Ensuring that current forestry data are assessed, placed in a GIS system, and made easily available;
v. Establishing a Forest Research and Training Institute in the country to focus on conservation, sustainable use, and effective management of forest areas;
vi. Digitizing of all deh maps and putting them on the national grid. This would help to end land disputes among local people and the Forest Department; it would also build a database for, inter alia, forestry, agriculture, irrigation structures, regular crop surveys and social surveys;
vii. Conducting research on desert farming and arid zone forest resources. Many other arid zone countries have pursued successful development projects in this field and there is much to learn and adopt from their experiences; and

viii. Undertaking research and studying the impacts of climate change on forestry.

7.3.5.3 Legislation

i. One of the most pressing concerns related to the conservation of forest resources is the existence of a contractor system and a timber mafia, which often functions under the protection of local authorities to facilitate illegal poaching. There is therefore a need to revise the existing laws;
ii. With improvements in transport infrastructure, this problem has been compounded over the years as large shipments of forest products can be smuggled out of these areas in a relatively short time;
iii. In addition, a number of forested areas are also being disputed by various parties. The appointment of a Forest Magistrate would expedite such pending cases. Legislation also needs to ensure that property rights, as they relate to forestry resources, are clear, non-discriminatory, and enforceable;
iv. Reviewing current forestry legislation leading to revision and amendments in current laws on the basis of sustainable use of forest resources;
v. Introduction of any species should only be undertaken after careful examination of their impact on local biodiversity. This concern should be effectively addressed in the existing legislation and should also be considered in any new legislation that is drafted;
vi. Reviving the Working Plan on coastal forests, which will lapse in 2005; and
vii. Develop National Range Land Policy and implementation strategy.

7.3.5.4 Social Forestry and Community Participation

i. It is important to pursue policies that encourage local participation and promote collaboration amongst government agencies and the private sector for the conservation and development of forest resources;
ii. Although not the primary source of degradation of forest resources, over exploitation by local communities to provide for their fuelwood and fodder needs is another strain that has been heightened by the increase in rural and urban population. Policies aimed at poverty alleviation are thus essential to provide people with alternative strategies for income generation and to practice forest conservation and regeneration;
iii. Social forestry practices to promote local participation and introduce farmer-friendly policies such as elimination of water rates in hurry, increased access to affordable credit, government incentives to encourage farmers to raise tree crops on their lands, and involvement of local NGOs to mobilize and help to organize local communities are crucial;
iv. Raising awareness on conservation of forests through the media, education curriculum, NGOs, and village organizations;
v. Educating the local communities on sustainable development principles including effective soil management, crop choice according to location, water efficient technology, use of brackish water with salt-tolerant species, rotational plantings, and the benefits of agroforestry; and
vi. Increasing community access to fuel efficient technology like fuel-efficient stoves and gas.

7.3.5.5 Sectoral Collaboration

Forest areas have a very direct link to other sectors especially in competition for limited resources. It is for this reason that the planning process should be made more holistic in

its approach to understand these linkages and devise an appropriate strategy accordingly. For instance, energy requirements are constantly growing and putting increased pressure on limited forest resources.

Therefore, it is very important to assess cross sectoral integration of the forest sector with other relevant sectors like agriculture, fisheries, industries, water resources, biodiversity, livestock, and rangelands. Projects that incorporate joint collaboration with other sectors will ensure that the policies are complementary to the sectors' needs.

7.3.6 Land-use Planning

i. Implementing programmes to encourage tree conservation and planting establishing green wind-breaks on arid lands to check erosion and desertification;

ii. Establishing green areas in all cities with a population of 50,000 or more reserving at least 25 percent of the area in new townships and industrial estates for use as parks, recreation areas, and green belts;

iii. Formulating, enacting, and enforcing pollution standards for emissions and discharges that impact on the wildlife of protected areas;

iv. Strengthening the capacities of relevant institutions to implement anti-pollution measures; and promoting forestry through urban development policies;

v. Replanting mangroves while providing alternate sources for fuelwood and fodder to help reduce the dependence of the local people on these forests. Also mangrove forests should be declared as reserve forests;

vi. It should be mandatory for trees to be planted along the sides of canals, roads, railway lines (and in stations), on flood protection bunds, and in the grounds of educational institutions, industrial complexes, and government buildings; and

vii. Ensuring that EIAs, which include social impact studies, are carried out for new projects related to infrastructure development and water resources.

7.3.7 Education

i. Public education efforts must continue and mechanisms found to ensure its sustainability and coordination and integration with the other Rio Conventions. Special emphasis to be placed on the judiciary, police, local government organizations and communities in protected areas; and

ii. Develop education/training programme for local communities on sustainable development principles including effective soil management, crop choice according to location, water efficient technology, use of brackish water with salt-tolerant species, rotational plantings, agro-forestry, alternative energy sources, efficiency of irrigation water, efficient fertilizer use, mechanization, horticulture, soil sodicity, water availability, desert farming organic fertilizer, and post-harvest technology and quality.

7.3.8 Early Warning and Fore- casting Systems

i. Strengthening of Meteorology Department for improvement in early warning systems and data management and dissemination systems with sustainable financial mechanism;
ii. Development of Inter-linkages for data / information sharing among related institutions involved in R & D, food security and emergency preparedness;
iii. Dissemination of information to farmers and local communities about weather forecast and early drought warnings; and
iv. Sustainable funding mechanism for National Disaster Management Authority (NDMA).

7.3.9 Alternate Sources for Livelihood/New skills/Access to Alternate Energy Technologies:

i. Development and introduction of cost effective alternate energy resources for communities living near forest areas, to minimize pressure on fuelwood; and
ii. National skill development programmes for alternate source of income of communities living in fragile ecosystems.

8. Recommendations for Cross Cutting Issues for each Convention

8.1 Recommendations for UNCBD

At Systemic Level:

1. BAP is the Pakistan's primary response to its obligations under UNCBD. Efforts should be made to implement BAP in its true spirit;
2. Aggressive funding programme must be launched taking into consideration all available sources both internal and external;
3. Procedures for funding to research and development projects should be simplified and opportunities should be explored within CBD's financial mechanism. GEF funding mechanism may be simplified & suggestions can be made through COPs;
4. Develop an integrated and long term national biodiversity inventory programme for components of biodiversity and indigenous knowledge;
5. Develop National Biodiversity Database and Integrated Networking System;
6. Improve coordination among policy making, law enforcing agencies, research organizations and local communities;
7. Revise the sectoral policies to include ecosystem approach;
8. laws regulating agricultural, veterinary and domestic chemicals and drugs may be amended for compulsory requirement of labelling systems to advise regulators and users alike on the proper control and use of these substances in order to avoid harm to the environment generally and to natural resources in particular in native languages;
9. Develop Biodiversity Law and Policy;
10. Develop a National Policy on Ex- situ Conservation;
11. Develop laws on access to genetic resources & sustainable use of biological diversity, keeping in view the Bonn Guidelines on genetic resources & likely international regime to be negotiated in the forthcoming future;
12. A Bonn Guidelines implementation Committee may be established at MoE with representation from MINFAL, S & T, Commerce, Industries etc. TORs of the committee may also include Pakistan's Preparation to negotiate for likely international regime to promote and safeguard the fair and equitable sharing of benefits arising out o the utilization of genetic resources;
13. Creative interpretation of the definition of "public purposes" provided in the Land Acquisition Act can be used by government to acquire land for conservation. In addition to the fees and charges provided for in PEPA, excise revenues could be levied specifically to fund natural resource conservation, restoration and rehabilitation. The tariff structure of central taxes and duties could be creatively deployed to encourage environment friendly commercial activities, and discourage the import of goods that are likely to cause environmental damage;
14. Expand PAs system to improve its representativeness, viability and connectivity and to ensure protection for all nationally and internationally threatened species of fauna & flora;
15. Explore the potential for establishing transboundary peace parks with neighboring countries;
16. Encourage private individual, corporations & NGOs to establish nature conservation areas under private/ charitable/ corporate ownership;
17. Develop a programme to control and management of ships' ballast water, to minimize the transfer of harmful aquatic organisms and pathogens;

18. Incentives to encourage ex- situ propagation / breeding programmes for traded species of wild plants & animals in order to reduce the drain of wild populations.
19. Develop national curricula for the educational institutes emphasizing biodiversity's contribution to local & national welfare, health of ecosystems the ecological, economics, CBD obligations and social themes together; and
20. Declare exit & entry points at international airports, seaport under CITES to control trade of endangered species.

At Institutional Level:

1. Federal and provincial departments and research institutions identified in Action Plan must be strengthened on priority basis to more effectively implement BAP;
2. EPAs may be strengthened / empowered to develop systems for the comprehensive monitoring of environmental loadings and socio-economic activities that impact natural resources. Such institutions could also be provided incentives to undertake activities aimed at promoting an understanding of the mechanisms of environmental change and predicting their impacts;
3. Build the management capacity of the Protected Area authorities through the provision of funding, equipment, technical staff & training;
4. The technical capacities of institutions like NARC, NIBGE and CEMB for bio-safety and risk management related to GMOs should be enhanced;
5. Capacity of National Council for Conservation of Wildlife (NCCW) which is functioning as Management Authority of CITES should be enhanced;
6. Capacities of PMNH, PFI, National Herbarium, and Botany departments of Universities many be enhanced and incentives be given for promotion of research on medicinal plants;
7. Build the management capacity of the Provincial Forestry & Wildlife Departments for conservation of biodiversity, particularly Protected Areas management / species management through the provision of funding, equipment, technical staff and training;
8. Capacities of ZSD and PFI which are working as scientific authorities for fauna and flora respectively under CITES should be strengthened;
9. A mechanism may be evolved to implement Coastal Areas Management Plan and technical and management capacities of relevant institutions be enhanced;
10. Establishment of state of the art and scientifically managed botanical and Zoological gardens at national and regional level especially in northern areas; and
11. Prepare an inventory of all the government and privately managed captive breeding centres, where CITES species are being bred, with a view to register them with CITES Secretariat.

At Individual Level

1. Appropriate training should be given to build capacity of environmental managers/researchers for preparation of research proposals/projects for international national funding;
2. Impart training courses to Custom officers in identification of wildlife, particularly endangered species, their products & derivatives & provide them species identification manuals prepared by the CITES Secretariat;
3. Career planning of research scientists involved in natural resource management and conservation should be done to give them more incentives for creative research and in order to stop brain drain in the country due to economic reasons;

4. Initiate a national training programme to develop expertise in the areas of taxonomy, natural resource mapping techniques, biodiversity inventory techniques and protected area management; and
5. Initiate a comprehensive and well coordinated national awareness raising programme on conservation and sustainable use of components of biodiversity in the country at grassroot level using print media, electronic media, CBO's, NGOs, Ulema and local communities.

8.2 Recommendations for UNFCCC

At Systemic Level:

1. The National governance systems may be strengthened to enhance their capacity of synchronization with climate change subsystems.
2. The capacity of subsystems such as Water, Energy, Forestry, Agriculture, Health etc may be built to effectively and efficiently address the issues of climate change and report to national system through human resource development, technology up-gradation and changes in operational mechanisms; and
3. Reliable data generation, collection and retrieval systems may be established for developing capacity to meet communication and reporting requirements of UNFCCC, Kyoto and post Kyoto regimes in addition to serving national planning and monitoring systems.

Institutional Level:

4. The capacity of the Ministry of Environment need to be enhanced substantially to effectively address the climate change combat endeavour as well other convertors UNCBD and UNCCD;
5. A Climate Change Management Organization (CCMO) may be established, as an autonomous body of the ministry of environment, for integrated management of mitigation and adaptation efforts.
6. The capacity of GCISC may be enhanced to produce more accurate assessment of climate change in the country for next 10, 20, 30,40,50,75,100, years.
7. Special efforts and projects may be initiated for assessment of vulnerability of various parts of the country and their capacities to readjust to changed societal and living conditions;
8. Perception surveys have been used in various countries to map the preparedness levels of various communities to face climate change. The same techniques may be applied in Pakistan to assess understanding level of the menace of climate change amongst various communities and segments of society such as scientific community, educated class, uneducated and illiterate persons, men, women, children, the poor and the minorities etc.; and
9. Capacity of educational and training institutions of all cadres such as universities, colleges, technical and vocational education and training (TVET) institutions alongwith specialized institutions such as GCISC, PMD, MEAs Secretariat etc be enhanced to impart education and on- the- job training in addition to off- the- job training.

Individual Level:

1. Appropriate training should be given to build capacity of environmental managers/researchers for preparation of research proposals/projects for international national funding; and
2. Initiate a national training programme to develop expertise in the areas of climatology, glaciology, GIS based monitoring/mapping of glaciers and glacial lakes, marine ecology etc.

8.2 Recommendations for UNCCD

Systemic Level:

1. Multi-stakeholder fora including provincial and local stakeholders, communities and farmers should be institutionalized as the primary means of policy review and debate;
2. Strengthening of the OIGF and PFDs for policy implementation, monitoring and review;
3. Training and awareness raising programmes for environmental managers, law enforcing agencies, with special focus on Environmental Conventions;
4. Develop mechanism for close coordination among provincial line departments and federal agencies for implementation of policies;
5. Provinces may be given autonomy on all aspects of forest investment and management, including the preparation of working plans, harvesting, sale, afforestation, credit, research and training programmes;
6. Redefinition of local rights, roles and responsibilities of the various stakeholders and clear land tenure arrangements are necessary. Forest ownership needs to be considered in terms of benefits to individuals, communities and the nation as a whole;
7. Rangeland policy and Rangeland Management Action Plan may be developed.
8. Land use policy and implementation mechanism may be developed;
9. Educating the local communities on sustainable development principles including effective soil management, crop choice according to location, water efficient technology, use of brackish water with salt-tolerant species, rotational plantings, and the benefits of agro-forestry, alternative energy sources, efficiency of irrigation water, fertilizer use, mechanization, horticulture, soil sodicity, water availability, desert farming organic fertilizer, and post-harvest technology and quality;
10. Introducing planning and urban design/management in the graduate and postgraduate curricula at relevant universities;
11. Disseminate a culture of conservation within the entire community via mass awareness campaigns conducted through the media, educational institutions, the private and public sectors as well as through organizations working at the grassroots level and local NGOs;
12. Sustainable funding mechanism required for trainings, research activities and to acquire new technologies;
13. Mobilizing funds through community led carbon sequestration and plantations in dry waste lands under UNFCCC;
14. Grazing fees should be rationalized and be realized for grazing in all state owned rangelands;
15. Establish/ strengthen food security system, including storage and marketing facilities particularly in rural areas;
16. Conservation and sustainable use of biodiversity for increasing the productivity of natural resource base especially conservation of medicinal plants and wildlife species through best management practices;
17. Mass media campaigns (print and electronic media) Publication of pamphlets, bulletins, news letters and wall charts for school children and general public and organize seminars/lectures for farmers, communities, politicians, administrators, etc., to disseminate information regarding land degradation issues;
18. Prepare drought preparedness and management, including drought contingency plan;
19. Cells/ units should be created/strengthened in MOE or MINFAL and provincial Planning and Development Departments including NAs and AJK for formulation of

policy, plans and projects for desertification and development of arid land resources and to support activities at provincial and federal levels;

20. The National Desertification Control Steering Committee may be reconstituted to guide the proposed desertification control / arid land development units in MOE or MINFAL. This committee will oversee the implementation of desertification control action programmes and will also act as advisory body in all matters relating to the plans and policies for desertification control, sustainable development and management of arid and semi arid areas and integration of anti desertification programmes with national development plans. Provincial desertification Control Steering Committees should also be constituted in the provinces including NAs and AJK; and
21. National Desertification Control Fund should be created with initial allocation of Rs. 10 -15 billion and funds ear marked for desertification control for each province.

Institutional Level:

22. Capacity development of EPAs and EPD to monitor all developmental projects and follow the mitigation measures;
23. Capacity building of Pakistan Forest Institute is urgently required in order to develop the human resource required in different fields related to implementation of UNCCD and NAP for desertification.;
24. Enhance national climatological, meteorological and hydrological capabilities and the means of relevant departments to provide for required data drought early warning;
25. Roster of independent experts with expertise having experience in the relevant fields of dry land management being maintained by UNCCD Secretariat be updated by making fresh nominations enabling Pakistan to be represented in the Committee of Science and Technology, Adhoc Working Groups as well as other relevant meetings;
26. Advice of Committee on Science and Technology on technology transfer should be collected and disseminated by the UNCCD focal point and also disseminate to the relevant stake holders in Pakistan on regular basis;
27. Capacity development of related departments for improvement of Rod Kohi irrigation system through innovation techniques and indigenous technologies by developing water storage facilities for combating drought spells for human and livestock population use;
28. UNCCD focal point should identify the relevant institutions in Pakistan which can be recommended for consideration by the Committee on science and Technology for ultimate recommendations to the COP for inclusion in UNCCD networking institutions. This would benefit the strengthening of the relevant Pakistani institutions by UNCCD;
29. UNCCD focal point in close collaboration with provincial focal point should identify the high priority areas affected by or vulnerable to desertification and drought;
30. UNCCD focal point should endeavour to establish liaison with Global Mechanism of UNCCD to get its advice on innovative methods of financing and sources of financial assistance to combat desertification and drought projects;
31. Pakistan being member of all the six Thematic Programme Net works (TPNs) under UNCCD should designate and strengthen the relevant institutions in Pakistan to coordinate the activities with host countries of TPNs to accrue the benefits of combating desertification in Pakistan in the following relevant fields:

    i. Monitoring and assessment of desertification and land degradation (TPN-1) - Host country China.

ii. Agroforestry and soil conservation (TPN-2) - Host country India.
iii. Sand dune fixation and range land management (TPN-3) - Host country Iran.
iv. Water resources management for agriculture in arid semi arid areas (TPN-4) - Host country Syria.
v. Combating desertification and mitigating drought impacts (TPN-5) - Host country is Mongolia.
vi. Local areas development initiatives (TPN-6) - Host country Pakistan.

32. Capacity building for desertification assessment through GIS and land sensing techniques to prepare maps of the extent and severity of desertification, and document various climatic and edaphic parameters by GIS techniques.;
33. Research for rehabilitation of degraded mountains slopes for enhancing and sustaining the productivity through afforestation and reforestation;
34. Conduct studies for range-livestock production through community participation in various ecological regions by increasing available forage through pasture management, reseeding and planting of depleted ranges with grasses and shrubs and motivating communities for rotational grazing;
35. Measures for amelioration of saline/sodic soils and improvement of drainage system to enhance crop production;
36. Studies on biological sand-dune stabilization techniques/technologies in the sandy deserts of Pakistan through integrated approaches;
37. Research for improving water recharging and water use efficiency in water scarcity areas construction of delay-action dams;
38. Measures for rehabilitation of mangrove forest resources through improved management practices, selecting new sites for mangrove plantation and providing alternate source of fuel for local communities;
39. On the basis of NAP for combating desertification, Pakistan has succeeded in getting funding for US $ 7 million under GEF new operational programme on sustainable land management. Part of this funding should also be utilized in capacity building of relevant institutions to implement NAP;
36. The capacity of relevant institutions should be enhanced to implement the following key programmes recommended in NAP to control desertification.

i. Dryland afforestation / agro forestry in gullied deforested areas
ii. Production and promotion of horticultural crops
iii. Improved crop production in dry lands
iv. Range/ livestock production
v. Soil and water conservation, water harvesting sand dunes stabilization
vi. Preservation of biodiversity in dry lands
vii. Rehabilitation and reclamation of saline / sodic soils
viii. Improvement of drainage and on- farm management

37. A portfolio of projects in different areas like afforestation range / livestock management , wildlife management , rehabilitation of saline areas etc in deserts / arid regions may be got prepared by the federal and provincial desertification control committees for funding from donor agencies like GEF ,UNEP, FAO ,ICIMOD ,IFAD.

Individual Level:

38. Appropriate training should be given to build capacity of environmental managers/researchers for preparation of research proposals/projects for international national funding;
39. Initiate a national training programme to develop expertise in the areas sustainable land management, natural resource conservation, range livestock production, forage production, and watershed management.
40. People in the desert areas should be provided with basic education facilities and short term duration trainings for the processing and marketing of their miscellaneous products.
41. Advocacy, lobbying, sensitization and educating communities (women education, training, and empowerment) and social mobilization is required while sharing the benefits of natural resources with communities and institutionalization participatory approaches.
42. Arid land research and development institutions are short of technical man power at various levels. There is a need for a country level comprehensive arid land education and training programme. University of Arid agriculture Rawalpindi may take the lead role. The Ms and PhD programmes of the University in arid agriculture and natural resources management especially range resources , wildlife sciences , soil and water conservation and dryland farming would be very useful contribution , arid research and extension institution may impart short term training to farmers and technicians; and
43. Career planning of research scientists involved in natural resource management and conservation should be done to give them more incentives for creative research and in order to reduce brain drain in the country due to economic reasons.

9. Lessons Learned

9.1 Data collection process

Anticipating the low turnout from stakeholders, the questionnaires deliberately covered a large spread of departments. 33% responses on all questionnaires were collected on the basis of respondent's relevant expertise. The supplementary system of direct interviews and the workshops managed to cover this deficiency effectively. However, need was felt for a centralized governmental agency to pursue for a compulsory response.

The major reasons for non-response were; lack of awareness and usual departmental apprehensions.

9.2 Assessment of Conventions

The level of awareness of government servants, research scientists as well as academicians was low. It was felt that except for few relevant individuals, the knowledge and capacity to deal with the Conventions was inadequate at all the three tiers i.e. individual, institutional and systemic. Acute budgetary constraints compounded the problem.

9.3 Institutional issues

Limited expertise and capacity of institutions posed a great challenge to the NCSA exercise. The institutions that have been examined and interviewed do not have sufficient infrastructure, equipment and trained /educated staff to meet the responsibilities of Rio Conventions. Lack of funds, technical expertise, equipment, necessary databases of information, etc. can be identified as the leading constraints. Political instability and fiscal crisis is further aggravating the problem.

Rapid transfers and posting of officials reduced the institutional memory. During the course of study three Secretaries, two Additional Secretaries and a number of mid-level officers were transferred Ministry of Environment, except the Director General (Env) who continued to provide continuity & leadership to this process.

9.4 Stakeholder's interest

NCSA team expected an enthusiastic response from the stakeholders. However, the team had to make strenuous efforts to coordinate the activities with the stakeholders.

Training and professional development of the administration in the institutions lacked due to low budgetary support.

9.5 Poor coordination and lack of recognition

Varied and vested interests are particular constraint for any cross-sectoral issue if one is trying to mainstream them with other policies and priorities. The institutional conflicts result from, lack of clarity and wrong perception of the role and position. As a result, instead of mainstreaming the environment in practice one could see its disregard. This happens, despite the existence of, many strategic documents on environment in the country.

9.6 Lack of technical experts' experience with socio-economic issues

Within the last decade, the most noticeable characteristics of the country have been significant changes in the societal structure (i.e. economic stratification of the population) and an increase in the number of impoverished citizens. The level of poverty has increased and the growing poverty does not recognize the principles of sustainable development and therefore is

manifesting natural resources overuse, mainly illegal, that leads to land degradation and loss of biodiversity. This aspect of socio-economic encroachment within the process has not sufficiently been studied in the last decade and need immediate attention.

9.7 Time constraints

The project was envisaged to be completed in 9 months. However, poor and slow response from the stakeholders, delayed the final outcomes of the NCSA. The project was completed in less than one year however; the Consultants feel that the given timeframe was not enough for such an exercise under the prevailing social and behavioural circumstances not withstanding that NCSA process in other countries has taken much longer time up to 18 months in some cores.

PART-II

National Capacity Building and Action Plan

10. National Capacity Building Action Plan

10.1 Action Plan for UNCBD

Sr. No.	Recommendations	Priority	Existing Capacity	Desirable Capacity	Time Duration	Responsible Institutions
1	**Need Assessment Study of Implementing Agencies of NCSA Action Plan:** To assess capacity building requirements in terms of human resource, equipment, infrastructure and financial assistance of key ministries, research organizations, policy making Institutions, departments, universities	High	NA	NA	1 Year	1. Ministry of Environment, 2. MEAs secretariat
2	**Human Resource Development** Education/training in natural resource conservation and management	High	Low	High	5 Years	1. Universities 2. PARC 3. Pakistan Forest Institute 4. NCCW 5. NIO 6. Provincial including AJ&K and NA Forest, Agriculture & Livestock and Wildlife Conservation Departments 7. PFI
3	**Implementation of Biodiversity Action Plan:** 6.1 Develop national biodiversity law and policy; 6.2 Training and education of environmental policy makers mangers and law enforcing personnel; 6.3 Develop national biodiversity database and networking system; 6.4 Secure high level & multi-sectoral support for BAP implementation; 6.5 Strengthen Federal Biodiversity Secretariat, Federal & Provincial Steering Committees, Biodiversity Working Groups by providing financial & technical support	High	Low	High	2 years	1. MoE 2. Planning & Development Commission of Pakistan 3. Ministry of Agriculture and Livestock 4. Ministry of Science and Technology 5. Ministry of finance 6. Research institutes, NCCW, NIO, PMNH, ZSD, National Herbarium 7. Provincial including AJ&K and NA Wildlife Conservation, Forest, Livestock, Irrigation, Fisheries Departments 8. P & D Departments Federal and Provincial including AJ&K and NA EPAs and EPD 9. PFI
4	**Identification and Monitoring**	High	Low	High	10 years	1. NCCW

	of Components of Biodiversity 1- Develop a Long term Biodiversity Inventory Program involving technical experts and community participation; 2- Identify national priorities for biodiversity conservation, including threatened ecosystems & species, hotspots; and 3- Create a national red data list of threatened / endangered fauna & flora:					2. NIO 3. PMNH 4. ZSD 5. National Herbarium 6. Provincial including AJ&K and NA Wildlife Conservation Departments 7. PFI 8. Bio Sciences Departments at Universities
5	**In-situ conservation:** 1. Build the management capacity of the protected area authorities through the provision of funding, field logistics, equipment, staff & training; 2. Identify priority areas for international designation under the World Heritage Convention, The UNESCO Man & Biosphere Programme and the Ramsar Convention; and 3. Enhance the capacity of local communities & NGOs to conserve, manage & sustainable use biodiversity.	Medium	Low	Medium	5 Years	1. NCCW 2. Provincial including AJ&K and NA Wildlife Conservation, Fisheries, Forest Departments 3. PFI
6	**Preservation of Indigenous Knowledge and Communities:** Develop inventory of indigenous knowledge of biodiversity and communities involving local experts.	Medium	Low	Medium	10 years	1. NCCW 2. Provincial including AJ&K and NA Wildlife Conservation Departments 3. PMNH 4. ZSD
7	**Ex-situ Conservation:** 1. Develop a national policy on ex- situ conservation; 2. Identify priority species & genetic resources in need of further ex- situ conservation efforts; 3. Strengthen institutions involved in captive breeding of rare species and to ensure protection of natural habitats of those species; and 4. Establishment of state of the art and scientifically managed botanical and zoological gardens at national and regional level especially in northern areas.	High	Low	High	5 Years	1. MoE 2. NCCW 3. Provincial including AJ&K and NA Wildlife Conservation & forest Departments 4. PMNH 5. ZSD 6. National Herbarium

8	**Incentive Measures for Sustainable Use of Biodiversity:** 1. Replicate existing communities based conservation efforts in other areas with financial incentives; and 2. Incentives to encourage ex-situ propagation / breeding programmes for traded species of wild plants & animals in order to reduce the drain of wild populations.	Medium	Low	Medium	5 years	1. MoE 2. NCCW 3. Provincial including AJ&K and NA Wildlife Conservation & Forest Departments
9	**Awareness at Community Level for Conservation of Components of Biodiversity:** Develop and implement a national mass awareness programme on conservation and sustainable use of components of biodiversity in regional language	High	Low	Medium	2 years	MoE
10	**Environmental Impact Assessment of Developmental Activities:** Capacity building of Federal and Provincial EPA, EPDs to monitor developmental activities and mitigations options reported in EIAs	High	Low to Medium	High	5 years	1. MoE 2. EPAs & EPD
11	**Handling of Genetically Modified Organisms/ Biosafety Protocol:** 1. Strengthening the Bio-safety focal point for coordination with the Convention Secretariat, Ministerial and Institutional Committees for implementation of Bio- safety Rules.; and 2. Seek scientific & technical training in the proper & safe use/management of biotechnology, risk assessment/risk management of bio- safety, enhancement of technological & institutional capacities in bio- safety.	High	Low	High	5 Years	1. MoE/Focal Point 2. Biodiversity Secretariat 3. The National Bio-safety Committee (NBC) 4. Technical Advisory Committee (TAC) on Bio-safety 5. Institutional Bio-safety Committee (IBC) 6. Pak EPA 7. PARC 8. Department of Plant Protection, MINFAL 9. Federal Seed Certification and Registration Department 10. (CAMB) 11. NIBGE
12	**Laws Related to Access to Genetic Resources & Sustainable Use of Biological Diversity:** 1. Develop Access Benefit Sharing Laws and their implementation mechanism with allocation of funds	High	Low	High	2 Years	1. MoE/Focal Point 2. Biodiversity Secretariat 3. PARC 4. SDPI 5. Provincial including AJ&K and Gilgit Baltistan Wildlife Conservation

	according to Bonn Guidelines; and 2. Initiate preparations to negotiate the likely international regime to replace Bonn Guidelines.					Department 6. PFI
13	**Clearing House Mechanism:** Strengthen Clearing House Mechanism to create linkages with the Convention Secretariat & relevant institutions for exchange of information on technology transfer; Biodiversity Secretariats in the provinces may serve as provincial focal points	High	Low	High	5 Years	1. MoE/Focal Point 2. Biodiversity Secretariat 3. Provincial Biodiversity Secretariat
14	**Access to Financial Resources:** 1. GEF funding mechanism may be simplified & suggestions can be made through COPs; 2. Opportunities should be explored within CBD's financial mechanism; and 3. Allocation through PSDP .	High	Medium	High	5 Years	1. MoE 2. Planning & Development Commission and P & D Departments
15	**Global Taxonomic Initiative(GTI):** Designate/strengthen national focal point for GTI implementation	High	Low	High	10 Years	1. Biodiversity Directorate 2. NHM 3. ZSD 4. National Herbarium, NARC 5. NCCW 6. Provincial including AJ&K and Gilgit Baltistan Wildlife Conservation & Forest Departments 7. Life Sciences Departments at Universities
16	**Global Strategy for Plant Conservation:** **1.** Implement Global Strategy for plant conservation; and **2.** Develop national targets and indicators on plant conservation & incorporate in relevant plans & initiatives.	High	Low	High	10 Years	1. Biodiversity Directorate 2. NHM 3. National Herbarium, NARC 4. Provincial including AJ&K and Gilgit Baltistan Forest Departments 5. PFI 6. Bio Sciences Departments at Universities
17	**Capacity to Prepare the Projects for Funding:** Capacity Building of research institutes for preparation of research projects for international/ national funding	High	Low	High	2 years	MoE/Biodiversity Directorate

18	Capacity Building of Environmental Managers & Decision Makers for Participation/Negotiation at CoPs, CBD Subsidiary Body and Adhoc Working Groups: Develop capacity building and training programme for environmental mangers and decision makers	High	Low	High	5 Years	1. MoE/Biodiversity Directorate 2. Focal Points

10.2 Action Plan for UNFCCC

Sr. No.	Recommendations	Priority	Existing Capacity	Desirable Capacity	Time Duration	Responsible Institutions
1	**Need Assessment Study of Implementing Agencies of NCSA Action Plan:** To assess capacity building requirements in terms of human resource, equipment, infrastructure and financial assistance of key Ministries, Research Organizations, Policy making Institutions, Departments, Universities	High	NA	NA	1 Year	Ministry of Environment
2	**Human Resource Development** Training in Climate and Climate Change processes	High	Low	High	5 Years	1. Universities 2. Global Change Impact Study Centre (GCISC) 3. NIO 4- PCRWR 5. Pakistan Forest Institute 6. Provincial including AJ&K and Gilgit Baltistan Forest /Agriculture & Livestock and Wildlife Conservation Departments
3	**Identification and Study of Climate Zones:** Development of Climate Change Scenario on zonal scales in Pakistan	Medium	Low	Medium	5 Years	1. GCISC 2. MET Department. 3. Survey of Pakistan
4	**Metrological Study of Northern Mountainous Areas:** Strengthening of Metrological network in Northern Mountains and improving Data Digitization and its access to users	High	Low	High	10 Years	1. PMD 2. GCISC 3. WRRI at NARC
5	**Technology Development:** Technology updating aimed at improving efficiencies of conventional technologies such as power plants and renewable technologies such as wind, hydro, solar, biomass, bio-diesel and bio-ethanol and non-renewals, such as ocean methane hydrate crystals to reduce our dependence on imported energy	High	Low	High	10 Years	1. WAPDA 2. Alternate Energy Board 3. Planning Commission 4. ENERCON 5. HDIP 6. PCSIR
6	**Institutional Development:** Capacity Building for technical know-how of related institutions to increase sensitisation and promote use of energy efficient products and technologies and	High	Low	High	10 Years	1. MoE 2. Mo S & T 3. Alternate Energy Board 4. PCSIR 5. HDIP

	best management practices whilst sustaining quality, reliability and performance characteristics					
7	**Policy Framework and Transportation Management:** • Review and refine existing policies to adopt lower emission transport technologies; • Remove barriers/tax reductions to encourage import of fuel efficient vehicles; • Setting up and promotion of mass transit system in larger cities; • Conversion of complete city transport busses on CNG; • More research and feasibility studies on bio-ethanol and bio-diesel; and • Encourage use of ethanol blend gasoline	High	Low	High	10 Years	1. Ministry of Environment 2. ENERCON 3. HDIP 4. CBR 5. Ministry of Communication 6. City and District Governments
8	**Data management and information System(DMIS):** Adoption of advanced technologies and equipments for the development of integrated database for use and preparing and regular updation of GHGs	High	Low	High	5 Years	1. Ministry of Environment 2. Federal & Provincial EPAs & EPD 3. HDIP 4. Traffic Police Departments 5. NIO
9	**Research and Development:** Proficiency in the use of relevant models to develop scenario for traffic emissions and use the environmental friendly fuel as adoptation measures	High	Low	High	5 Years	1. Traffic Police Departments 2. Federal & Provincial including AJ&K and NA EPAs & EPD 3. Universities
10	**Glaciers and glacial lakes:** Adoptions of new technologies using GIS and remote sensing technologies for monitoring of Glaciers and GLOF	High	Low	High	5 Years	1. GCISC. 2. PMD 3. WRRI at NARC 4. Survey of Pakistan
11	**Water resources and irrigation system:** Bridge the knowledge gaps on the impacts of climate change on the hydrological cycle and proficiency to study the variability of the flood and drought situation and development of early warning systems	High	Low	High	5 Years	1. WAPDA 2. PCRWR 3. PMD 4. National Disaster Management Authority 5. WRRI, NARC
12	**Agriculture:** Assessment of possible geographical shifts of crops as a result of climate change and	High	Low	High	5 Years	1. Ministry of Food, Agriculture and Livestock 2. PARC 3. Provincial including

	identification of new cropping system in accordance with the climate change scenarios.					AJ&K and NA Food & Agriculture Department 4. Agriculture Universities
13	**Livestock and Fisheries:** 1. Research on new varieties of fodder crops suitable under water stress and high temperature conditions 2. Upgradation of veterinary research in the country with trained human resource and equipment. 3. Establish database for collective use of information 4. Research on Climate Change Impacts on Fish Production	Medium	Low	Medium	10 Years	1. Ministry of Food, Agriculture and Livestock 2. PARC 3. Provincial including AJ&K and Gilgit Baltistan Livestock and Fisheries Departments 4. Veterinary Universities/ Departments at Agricultural Universities
14	**Forestry and land use:** 1. Simulation modelling for different scenarios for the assessment of changes in the forest area, productivity, insect life cycle, spread of forest pests etc. and possible shift in the location of biomes under the changing climate. 2. Socio - economic implications of climate change on forest ecosystem	Medium	Low	Medium	10 Years	1. Forestry Wing, MoE 2. Provincial Forest Departments 3. PFI 4. Provincial including AJ&K and Gilgit Baltistan Forest Institutes 5. PARC 6. Forestry and Range Management Departments at Agricultural Universities
15	**Coastal Zones:** 1. Studies on global climate system and possible sea level rise with identification of adaptive measure and response strategies 2. Monitoring Hydrodynamics of coastal areas and beach profiles 3. Enforcement of stringent laws on setback distance and construction guidelines in coastal areas	Medium	Low	Medium	5 Years	1. National Institute of Oceanography (NIO) 2. GCISC 3. Pakistan Navy 4. Coastal Areas Development Authority 5. Provincial Wildlife Conservation Department 6. SUPARCO
16	**Biodiversity:** Research on Climate Change impacts on species with reference to their possible extinction	Medium	Low	Medium	5 Years	1. NCCW 2. ZSD 3. PMNH 4. NARC 5. Provincial including AJ&K and NA Forest Departments 6. Botany & Zoological and Environmental Sciences Departments at Universities
17	**Inland Water Bio-diversity:** 1. Research on effect of warming of water bodies on biological processes and aquatic life.	Medium	Low	Medium	5 Years	1. PMNH 2. NCCW 3. Provincial including AJ&K and NA Wildlife

	2. Studies on effects on migratory birds due to change in habitats, water, salinity, inundations.					Conservation & Fisheries Departments 4. Academic Research Institute
18	**Health:** 1. Research on new diseases emerging as a consequence of changing climate. 2. Research on the understanding of physiological responses of human beings to risen temperature 3. Region specific health scenario studies	High	Low	High	5 Years	1. Ministry of Health 2. National Institute of Health (NIH) 3. Provincial including AJ&K and NA Health Departments 4. Medical Research Institutes 5. Bio Science Departments of Universities.
19	**Extreme events:** 1. Development of past and projected climate extreme indices, for the assessment of their impacts on different socio-economic factors 2. Linkage of statistical based climate extreme indices with event based indices like floods, clouds, tornados, cyclones	High	Low	High	5 Years	1. NDMA 2. PMD 3. GCISC 4. SUPARCO 5. NIO
20	**Socio-economic conditions:** 1. Economic analysis of cost and opportunities associated with climate change in the country. 2. Estimates of social and economic benefits of various mitigations and adaptations measures taken to reduce the impact of climate change	High	Low	High	5 Years	1. Economic Affair Division 2. Ministry of Environment 3. PARC 4. Pakistan Institute of Development Economics 5. Statistical Division, Government of Pakistan
21	**Clean Development Mechanism:** Capacity building of CDM Cell and relevant institutions to design and explore more CDM projects for carbon trading especial in energy, forestry and transport sector	High	Low	High	5 years	1. MoE/CDM Cell 2. Ministry of Industries 3. ENERCON 4. HDIP 5. PFI
	Capacity Building of Environmental Managers & Decision Makers for Participation/Negotiation at CoPs, MoPs of UNFCCC: Develop capacity building and training programme for environmental mangers and decision makers	High	Low	High	2 Years	1. UNDP 2. MoE 3. Focal Points

10.3 Action Plan for UNCCD

Sr. No.	Recommendations	Priority	Existing Capacity	Desirable Capacity	Time Duration	Responsible Institutions
1	**Need Assessment Study of Implementing Agencies of NCSA Action Plan:** To assess capacity building requirements in terms of human resource, equipment, infrastructure and financial assistance of key Ministries, research organizations, policy making Institutions, Departments, Universities	High	NA	NA	1 Year	Ministry of Environment
3	**Human Resource Development:** Training in sustainable land management for environmental managers, researchers, policy making institutions, law enforcing agencies and CBOs	High	Low	High	5 Years	1. Universities 2. PARC 3. Pakistan Forest Institute 4. Provincial including AJ&K and NA Forest /Agriculture & Livestock and Wildlife Conservation Departments
4	**Policies/Laws:** 1. Multi-stakeholder fora should be institutionalized as the primary means of policy review and debate and to ensure participatory approaches during policy development 2. Develop a mechanism for close coordination among provincial line departments and federal agencies for implementation of policies 3. Redefine the land tenure rights 4. Develop National Rangeland Policy and National Rangeland Management Action Plan.	High	Low	High	5 years	1. MoEPFI 2. Provincial including AJ&K and NA Forest Departments 3. PARC 4. WAPDA 5. PMD 6. NGOs / CBOs
5	**Unplanned Land Use/Agricultural Extension:** Develop national land use Policy and implementation mechanism with allocation of financial resources	High	Low	High	2 Years	1. MoE 2. MINFAL 3. Planning and Development Commission 4. Provincial and District Governments
6	**Alternate Sources for Livelihood/New skills/Access to Alternate Energy Technologies:**	High	Low	High	3 years	1. 2. Alternate Energy Board 3. PICRET 4. PCSIR

	1. Development and introduction of cost effective alternate energy resources for communities living near forest areas to minimize pressure on fuelwood **2.** National skill development programmes for alternate source of income of communities living in fragile ecosystems					5. Planning and Development Commission, Provincial including AJ&K and NA P & D Departments
7	**Early Warning and Fore- casting Systems:** • Strengthening of Meteorology Department for improvement in early warning systems and data management and dissemination systems with ssustainable financial mechanism • Interlinkages for data / information sharing among related institutions involved in R & D, food security and emergency preparedness; • Dissemination of information to farmers and local communities about weather forecast and early drought warnings • Sustainable funding mechanism for National Disaster Management Authority (NDMA)	High	Low	High	5 years	1. Planning & Development Departments 2. Ministry of Finance 3. Ministry of Defence 4. PMD 5. SUPARCO 6. PARC 7. NDMA
8	**Systematic Observation of Land Degradation/ Desertification:** 1. Desertification assessment through GIS and land sensing Techniques to prepare maps of the extent and severity of desertification, and document various climatic and edaphic parameters by GIS techniques 2. Identification of alternative land uses and analysis of the ecological, economical /financial and social sustainability of each in order to identify the SLM practices to be encouraged through policy, regulations and incentives	High	Low	High	5 years	1. PMD 2. SUPARCO 3. PARC 4. PFI 5. MINFAL 6. Provincial AJ&K and NA Forest and Agriculture Departments
9	**Training of Environmental Managers & Decision Makers for Participation/Negotiation at CoPs, MoPs of UNCCD:** Develop capacity building and	High	Low	High	2 Years	1. UNDP 2. MoE/ Advisory Panel on Climate Change 3. Focal Point/MoE 4. GCISC

	training programme for environmental mangers and decision makers					
10	**Research and Development/ Public-private Partnership, Joint Research Programmes for New Technologies:** 1. Research for water efficiency through high-tech irrigation system 2. Research on identification of drought resistant local fodder varieties 3. Watershed analysis using satellite remote sensing data 4. Assessment of seasonal biomass productivity and nutritional quality of major range forage species 5. Research on fast-growing tree species, to increase production for quick returns; 6. Joint public-private opportunities for development of new technologies may be explored					1.PCRWR 2.PARC 3.PCSIR 4.PFI 5.Universities of Agriculture 6.Barani Area Development Agency 7.Cholistan Development Authority 8.Provincial including AJ&K and NA Forest, Irrigation & Agriculture Department 9.WAPDA
11	**Education/Training for Local Communities:** Develop education/training programme for local communities on sustainable development principles including effective soil management, crop choice according to location, water efficient technology, use of brackish water with salt-tolerant species, rotational plantings, agro-forestry, alternative energy sources, efficiency of irrigation water, efficient fertilizer use, mechanization, horticulture, soil sodicity, water availability, desert farming organic fertilizer, and post-harvest technology and quality					1. MoE 2. M/o education 3. MINFAL/PARC 4. PFI 5. PCSIR 6. PCRWR 7. Provincial including AJ&K and Gilgit Baltistan Education, Forestry & Agriculture Department 8. Federal and provincial including AJ&K and NA EPAs
12	**Urban Design/Management**: Introducing planning and urban design/management in the graduate and postgraduate curricula at relevant universities.	Medium	low	Medium	3 Years	1. PFI 2. Engineering Universities
13	**Funding Mechanism:** 1. Sustainable funding mechanism required for trainings, research activities and to acquire new technologies	High	Low	High	5 Years	1. Planning and Development Departments 2. Ministry of Finance 3. MoE Forestry Wing 4. Provincial including

	2. Mobilizing funds through community led carbon sequestration plantations in dry waste lands under UNFCCC 3. Grazing fees should be rationalized and be realized for grazing in all state owned rangelands 4. Explore opportunities through UNCCD funding mechanism					AJ&K and NA P & D Departments
14	**Sustainable Range-livestock Production:** Research on Range Livestock Production through community participation in various ecological regions by increasing available forage through pasture management, reseeding and planting of depleted ranges with grasses and shrubs and motivating communities for rotational grazing	Medium	Low	Medium	10 Years	1. MoE 2. PARC 3. MINFAL
15	**Rehabilitation of Mangrove Forest:** Rehabilitation of mangrove forest resources through improved management practices, selecting new sites for mangrove plantation and providing alternate source of fuel for local communities	High	Low	High	10 Years	1. Sindh and Balochistan Forests Departments 2. Coastal Zone Development Authority 3. PARC 4. NGOs
16	**Awareness Raising:** Mass media campaigns (print and electronic media) publication of pamphlets, bulletins, news letters and wall charts for school children and general public and organize seminars/lectures for farmers, communities, politicians, administrators, etc., to disseminate information and sensitize stakeholders regarding land degradation issues	High	Low	High		1. MoE 2. PARC 3. Provincial including AJ&K and NA Forest Departments 4. Media 5. NGOs 6. CBOs

10.4 General Recommendations for Action Plan

10.4.1 Government Reforms

1. Potential reorganization of government environmental responsibilities: In this regard as a first step restructuring/strengthening of Ministry of Environment is recommended. The present strength of non-technical officers working in Environment Wing of MoE may be replaced with environmental specialists/subject specialists except on administrative and financial posts up to Joint Secretary level. Necessary secretarial trainings to these technical officers can be given to harmonize their working. These technical posts should be non transferable so that the ministry may retain institutional memory.
2. Strengthening of the Environmental section of Planning commission, and P & D Departments and the Environmental Protection Agencies (EPA) & institutions mentioned in Action Plan at federal as well as provincial level including AJ & K Gilgit & Baltistan by induction of technical human resource;
3. Policy and programme reforms;
4. Introducing strategic planning processes focusing on decentralization by giving more autonomy at provincial and district level to deal with the regional environmental issues, giving incentives;
5. Strengthening of environmental impact assessment (EIA) processes and State of Environment reporting mechanism;
6. Vision and a built in mechanism of accountability within public organizations; and
7. Incentive for individuals on creativity and research initiatives in environmental sector.

10.4.2 Inter Departmental Coordination

Significant environmental and natural resource management responsibilities are distributed throughout federal ministries and provincial government departments. There are discernible problems of coordination among these departments, partially due to the inflexibility in their mandates and limited resources but also due to the area of operations (jurisdiction). Thus, it may be useful to consider establishing linkages and focal points between these departments.

10.4.3 Role of Ulema

Ulema (religious scholars) remain the most potent and influential for the change of social behavior. They exercise power over the minds and emotions of a majority of the people and can give Islamic relevance to environmental issues. The vast network of mosques makes them the most functional medium of communication, especially for the rural public. Religious leaders can be convinced to include environment in the curricula of religious madrassas (schools).

A core of ulema should be sensitized to the environment and its issues so that they can communicate and train others. A special package to support training of master trainers among ulema may be produced. The Ministry of Religious Affairs and the Auqaf Department should help.

10.4.5 Mass Awareness

1. There is a need to increase the environmental consciousness of federal provincial line departments, NGOs and communities especially youth and women, to make them aware of the importance of the environmental issues and sustainable use of natural resources.
2. The capacity of NGOs especially for communication may be improved and an information package on the subject be developed and distributed among stakeholders.
3. A group of drama writers, environmentalist and media persons with environmental consciousness be formed and one hour TV plays produced on environmental conservation themes and presented weekly on every channel to sensitize the public on environmental issues. For this purpose, necessary amendment will be required in PEMRA Rules. Cable networks should also be used.
4. There is a need to re-orient the media—journalists, and radio and television producers to environmental issues.
5. Media, both electronic and print should play an important role in communicating the sustainable use of natural resources. At one level they have the advantage to reach out to decision makers, and at another level they reach out to the grassroots.
6. Cinema, puppetry, theatre, folk art, and music festivals also have the potential to inform, educate, and communicate with the people. They would need certain amount of skills training and continuous flow of information on the environment to communicate the message effectively.
7. A group of puppeteers, theatre artists, and local singers may be trained and supported to write and present shows and also to train others. The Unions of Journalists and the provincial Information Departments should be act as resource institutions.
8. An Environmental Information Management/Reporting Centre (EIMRC) may be established in Islamabad and all provincial capitals including AJK and Gilgit Baltistan. The proposed centers may be incorporated with already existing rescue services in major cities. The network of such services may be extended in all environmentally sensitive areas of the country.
9. The creation and operation of a forum of environmental journalists will be very helpful. In curriculum of Journalism environmental reporting system may also be added, like crime reporting etc.
10. It will be crucial to use the knowledge base of the general population to raise awareness of the complex nature of environmental problems and in the process use information as a tool to help people find solutions. More than 70% of the people live in villages. They have a direct and close contact with nature. They are the major beneficiaries of natural resources and at the same time affected by environmental problems. The success of any environmental communication campaign will largely depend on the effective dissemination of the messages to these rural people.
11. Deputy Commissioners/Nazims with the support of NGOs should encourage influential people within communities and hold meetings and discuss environmental issues.

10.4.6 Environmental Education

1. A focal point for improved environmental education should be based in Education Ministry at federal and the Education Directorate in provinces including Gilgit Baltistan and AJ & K.
2. Introduction of environmental education in schools at primary level.
3. Through human resource development, teachers training courses must provide teachers with the opportunities to become experienced in resolving environmental issues. Teachers have to be fully equipped with effective methods for introducing environmental education in appropriate subject areas.
4. Similarly, teachers' perceptions also need to be changed. Often, teachers do not see any connection between what they are teaching and environmental concepts and issues. Consequently, they do not feel that it is their responsibility to teach about the environment.
5. Environmental educators are in short supply in Pakistan. Certificate courses in environmental education are not available in the country. A three-month or six-month certificate course on environmental education, awareness, and communication may be introduced. In this regards NGOs like IUCN, WWF and LEADS Pakistan can play important role in collaboration with Education Ministry and EPA.
6. Groups of master trainers for environmental education be produced. The training of trainers and master trainers would be a more strategic move for environmental educators. Given the opportunity and the resources, their expertise could be made available to the provincial Education Departments including AJ & K and Gilgit Baltistan.

10.4.7 Decision Makers & Professionals

1. The environmental orientation of government officers is necessary as a basic need today. The National Institute of Public Administration, the Pakistan Military Academy (PMA) Kakul, the Pakistan Institute of Management Studies (PIMS), and the Pakistan Academy for Rural Development (PARD) are the key institutions that can play an important role in this regard.

2. The PMA Kakul is responsible for pre-service and in-service professional trainings of all commissioned officers in the military. Although the army nurtures trees, the potential threat to wildlife during army exercises needs to be taken into account by them. Hence there is an urgent need for integrating environmental components in the PMA training programmes. The Pakistan Institute of management sciences (PIMS) aims to promote management development in the country. Services offered by the PIMS include in-country courses, research and publications, and management consultancy services in the area of strategic planning, human resource management, marketing management, and organization development. Its clients may include the government, private-sector groups, business, and industry. Therefore inclusion of environmental education components in these courses could have a direct impact.

3. Parliamentarian should be briefed on environmental conservational issues by group of experts so that they can effectively play their role in framing environmental legislation

and awareness raising in their areas of influence. A house committee may be formed with power of accountability on environmental issues.

4. Establish/strengthen environmental cell at chambers of commerce at federal and provincial level including AJ & K and Gilgit Baltistan.

5. The armed forces leadership may be taken into confidence to take part in environmental rehabilitation activities especially in the areas under their influence.

11. Implementation Strategy

1. Since inception of the Multilateral Environmental Agreement, World Community is increasingly cognizant of the fact that capacity constraints is a major hurdle in dealing with cross cutting technical environmental issues highlighted in these treaties.
2. Efforts at global level are underway to address the problem of capacity deficiencies through directing more funds towards building capacity of the professionals from developing and underdeveloped world. Concepts of sustainable development can only be materialized through building a strong workforce of professionals to tackle the environmental issues of the twenty first century and incorporate the environmental concerns in the development policies and processes followed by these countries. Health of the life support systems (eco-systems) can be maintained by adopting appropriate policies with clear focus on the sustenance of development process and simultaneously protecting the environment and nature. Continued existence of various life forms is indeed the basis for sustainability of the planet earth.
3. Ministry of Environment is the focal point of all environmental conventions including the ones adopted at Rio. The capacity building needs of the Ministry in this regard is paramount.
4. As quantum of obligations under the multilateral environment agreements increase and new environmental issues surface, additional of capacity building needs would be imminent, such as environmental conventions on chemicals etc. In due course of time the present facilities the ministry may be upgraded to the level of National Environmental Capacity Development Centre (NECDC) for implementation of the recommendations as outlined in this document and other environmental conventions are protocols. To this end, the current capacity level of the facilities in the minimizing may be enhanced by providing services of experts and funds for better logistical arrangements through donor agencies, like UNDP.
5. An Inter-Institutional Coordination Committee may be formed in proposed National Environmental Capacity Development Centre (NECDC) to carry forward the implementation of activities around which synergies can be built and achieved, namely, for the education and public outreach, training and retraining, and joint research programmes. For the implementation of recommendations under the sub thematic areas, the key executing agencies mentioned in Action Plan would be required to take the lead role.
6. The implementation of this Action Plan should be coordinated by MoE involving not only the EPAs, provincial departments and key national institutions identified in National Capacity Building Action Plan but also the private sector, civil society and communities.
7. As stipulated in the NCSA "Guide for Self-Assessment" (GEF-UNITAR 2001) and "Resource Kit" (GEF-UNDP 2004), the implementation of this Action Plan should be linked to other international and national initiatives. This approach will ensure that sustainability of the NCSA capacity building initiative will continue in the future.
8. Funding for the implementation may primarily come from the Government of Pakistan (through MoE) with support also from development partners, particularly GEF/UNEP and other multilateral and bilateral donors. With support of development partners in identified specific priority areas, projects with budgets will be developed. Alternatively,

development partners may be encouraged to contribute to already proposed projects as co-financing partners.

9. The proposed time-frame for the Action Plan is 5-10 Years, starting 2009. It is, however, emphasized that capacity building is a long-term process and therefore, it will be desirable that these activities may continue even after the 5 – 10 year phase recommended for this purpose.

10. Monitoring and Evaluation: In the past, the implementation of development activities has, to a large extent, failed due to lack or poor flow of vital information to managers and stakeholders. This has contributed to poor implementation, management and in some cases the eventual abandonment of programmes and projects before their full implementation. This is mainly because the implementation processes did not allow full participation of stakeholders in decision- making and utilization of monitoring information in making management decisions. To avoid recurrence of this and to give stakeholders full control of the development process, a consultative and participatory performance based monitoring and evaluation process needs to be adopted for the NCSA Action Plan. The monitoring and evaluation (M&E) plan should, therefore, include provisions for:

    (i) Collecting and reporting data on performance indicators identified in the Plan;

    (ii) The schedule of planned mid-term reviews, self-evaluations, and concluding evaluations;

    (iii) A description of how monitoring and evaluation activities will involve participants and stakeholders;

    (iv) Resources are be allocated for monitoring and evaluation activities; and

    (v) Monitoring and evaluation results will serve as a guide in achieving Action Plan objectives.

12. Way Forward

1. High level political support and strong coordination among federal and provincial institutions would be essential for the successful implementation of the NCSA recommendations. To carry out the task of implementing the National Capacity Development Action plan, an Inter-Institutional Coordination Committee has been recommended to develop synergies among activities in various institutions for the education and public outreach, training and retraining, and joint research programmes. For the implementation of recommendations under the sub thematic areas, MoE should assume the lead role.

2. The strategic recommendations for capacity building made under this NCSA report can best be implemented within a series of capacity building programmes and led by the key executing agencies concerned mentioned in National Capacity Building Action. The capacity building process should be seen as a dynamic process requiring appropriate evaluation and necessary re-engineering in line with national and global challenges. Monitoring and evaluation has to be inbuilt in the capacity building programmes and for these purpose a strong monitoring and evaluation mechanism should be evolved.

3. The scheduling of the recommended activities would be subject to availability of funds and in general, upon logical ordering requirements with the systemic capacity building recommendations implemented either prior or concurrently with measures pertaining to institutional and individual levels.

4. Funding being one of the key limiting factors, the capacity building measures may be formulated into as a Medium Sized Project and submitted for GEF for approval and funding.

5. Integration of the recommended research areas in the national priority list as well as financial support / grant to undertake such research activities to be further considered by existing agencies such as Planning and Development Commission, Pakistan Science Foundation, Pakistan Council for Scientific and Industrial Research, Pakistan Agriculture Research Council etc.

6. Capacity building should be supported through bilateral technical cooperation. Opportunities in this regard be explored under bilateral, regional and international arrangements.

7. Priority should be flow on the use of relevant local expertise for capacity and skill enhancement for the various training areas identified including the specialized training. Only in the event that the required training facilities/trainers are not available locally, international expertise may be resorted. In such cases, 'train the trainer' approach should be given preference for local training.